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IN our last issue, page 433, in recording the excellent work done at the Union Steel Company's Works of 20,398 tons of rails rolled in November, we stated it to be the best month's work yet done. We should have made a single exception, the Edgar Thomson works, which rolled 20,681 tons in one month. These, we believe, are the highest records yet made.

IT is announced that the British Iron and Steel Institute has decided to hold an autumnal meeting of the Institute in the United States in 1888. It will give Americans great pleasure to receive them, and probably after they have had the opportunity of learning what we have in this country, some of them will remain to join in developing its unrivaled natural resources.

CALUMET & HECLA FIRE.

The Calumet & Hecla fire is still the uppermost question in the trade, and we have many inquiries as to the facts in regard to it. We learn from our usual thoroughly well informed sources that on the 10th inst. some ground settled down near the collar of the Hecla man-engine shaft, making a vent for the steam, gas, smoke, etc.; volumes of gas, seemingly for the most part steam, poured forth for the time, creating much excitement, and every effort was made to fill up the hole again at once. This cannot, however, be regarded as an indication that the fire is now raging fiercely near the surface. The vapor did not denote this; but when a settling of this kind commences it is difficult to set a limit to the area that may be affected later, because the hanging wall rock in this section of the mine is much broken, and has settled from the surface before. The question to solve is what effect will this opening, and probably subsequent cracks and fissures, have on the fire? May it not be very difficult, under the circumstances, to extinguish it, even with gas and steam? This much is certain, combustion must *cease* before it will be safe to continue work, even if it be reduced sufficiently to admit of entering the mine.

It is most difficult to set any time when the mine can be opened. The management is doing all it can without flooding, and that will certainly not be resorted to. They have a very difficult job on their hands, and the best informed know nothing more to suggest than they are doing. It is questionable whether many people would do so much, for battening down has generally been considered sufficient.

The damage underground must necessarily be a serious matter. The Hecla part of the mine is practically disabled for a good while.

Latest. We have to-day (December 16th) received the following telegram from the mines from a well informed and reliable correspondent:

The surface indications present no material change from a week ago. Authorities' opinions are supposed to be that this fire will be quickly extinguished, and signs are hopeful. No time for opening the mine has yet been made public. No damage has come from the cave at the surface, which resulted probably from injected steam rather than from fire.

THE APEX AGAIN.

We quoted with approval last week an opinion of Chief Justice ZANE, of Utah, on the question of title raised by an apex partially in one claim and partly in an adjoining parallel claim. In this case, as Judge POWERS had already put it, "appeal must be had to the miners' unwritten law of discovery, which gives it to the prior locator." As we observed last week, Judge ZANE has supported this conclusion with a novel and ingenious argument, based on Section 14 of the Act of 1872.

That argument seems to us perfectly sound, and the result to which it leads seems perfectly equitable. *for all cases in which the apex in dispute is the apex of the lode upon which the prior location was made.* In such cases, to give the whole vein (between end-lines) to the prior locator, is to give it to the first discoverer. But it is not difficult to imagine a different state of things.

Suppose, for instance, that A has made a location on the outcrop of a certain discovered lode, and that an adjoining parallel location is subsequently made by B on a parallel lode, not discovered by anybody until B found it. Suppose it should be found that B's apex is partly in his own ground and partly in A's, though B's lode is entirely distinct from the lode of which A has the whole apex. It is evident that in this case, as to the precise lode in question, the prior locator is not the discoverer. Yet we think the law would give to A, not only the lode upon which he first located, but also B's lode, the apex of which is partly within A's claim. It is only another instance of the inherent absurdity of the Apex law. Fortunately, it is not a very probable case. It does not often happen that two lodes of value occur within one claim.

As we took occasion to notice, Judge ZANE's opinion does not recognize the requirement that the whole of the apex must be at any point within the prior location, although this requirement was fulfilled on the face of the papers submitted to him in the case under appeal. To us it seems to have merely this significance, that all the courts, up to the U. S. Supreme Court, have attached considerable weight in mining cases to evidence of good faith on the part of the locator. When a man has tried to make his location according to the law, and has come pretty near doing so, the courts do not willingly allow him to be dispossessed by reason of minor natural irregularities in the ore-deposit. Hence the claimant who has "the age" and half the apex will be all the better off if for some portion of the length of his location he has the whole apex beyond dispute. Yet we do not see how, under Judge ZANE's argument, this condition can be deemed absolutely essential.

THE COPPER OUTLOOK, PRICES AND PRODUCTION.

The present wild speculation in copper has gone further and has lasted longer than any one in the trade expected, and it has now become the absorbing topic in mining, as well as in trade circles.

We are asked from many directions, "What are the foundations of the boom? How high will it go? How long will it last? What is the future price of copper likely to be?"

We can not pretend to answer all of these important questions, but we are possessed of information which enables us to throw light on some of them, and may aid in allaying an excitement that threatens to do much injury, both to mining and to trade.

As has been pointed out many times in these columns, the low prices

for copper which ruled through 1885 and 1886 and a portion of this year, and which attained their minimum with Lake copper here at 10 cents, or a fraction below this, and Chili bars at £39, in London, were below actual cost in so many mines that the production of the world fell behind the consumption, which these low prices had rapidly increased. It was evident that a rise in prices must come, and it would have been far better for the entire trade had it come gradually as these facts became apparent, and had it stopped at a lower point than it has now reached.

The effect of a great advance in prices is not only to increase production, which is a somewhat slow operation, but to lessen consumption which comes with great rapidity.

The present advance was due to the manipulation of the foreign market, primarily by the French syndicate, who, acting on the well known strong statistical position of the metal, purchased nearly the entire stock of Chili bars in London, and as much copper here as they could obtain. The chief parties behind this movement were heavy holders of Spanish copper shares, and the enormous advance in these has brought them magnificent profits. Chili bars were run up from £39 to £80 7s. 6d., and Rio Tinto shares advanced from £9⅝, November 5th, to £24½, at which they stand to-day, December 16th.

Our market has followed, Lake Copper advancing from 10 cents a month or two ago to 17½ cents to-day.

The real foundation for the boom was undoubtedly the fact that consumption had overtaken and passed production, and that a continuation of the old prices would lead to a famine of copper. The immediate cause of the sudden advance id prices was a well organized, strong manipulation of the foreign market in the interest of holders of copper shares, and the height to which the boom will go, and how long it will last, can only be answered by the syndicate that is conducting the raid; but we can give some facts which will eventually control the situation —not, however, until the syndicate has unloaded its copper shares on the hungry public at high figures, and has sold out a large part of its copper to excited speculators.

We know that 10 cents for lake copper, and £39 for Chili bars will not bring about a production equal to the consumption of the world.

What price will bring about an equilibrium? This evidently is the starting point, and as nine tenths of the world's copper is produced by a small number of mines, the question is not difficult to answer. Without anticipating the statistical figures on which this answer rests, and which will appear in these columns in a few weeks, in our usual annual review of the trade, we may assume that even less than 12 cents for lake and £45 for Chili bars will bring a full supply for the demands of consumers.

The unfortunate Calumet & Hecla fire has been worked to the utmost limit in forcing up the prices; yet that company is now producing about 2,000,000 pounds a month, and even should the fire continue for some months, it will not seriously affect the total supply of the market. The production of the Lake mines is less this year than it was last by from two and a half to three million pounds only, and, whatever prices may be next year, the production will be much larger than it is this year —barring fires, of course.

The Calumet & Hecla and the Tamarack will increase largely next year.

The Anaconda, and the Boston & Montana, will also enormously increase output, while some of the Arizona companies are in a position to produce more than they have been sending out.

The cost of production, in all of these districts, by the large producers is being lowered and the quality and prices of Western copper are approaching more nearly to those of Lake, so that an advance to 12 cents for Lake will leave the large producers fair profits, while such a price would not induce the reopening of mines that cannot possibly produce copper for less than 14 or 15 cents. The present prices are far above those which will induce an ample production, and their effect is already being shown in the revival of all sorts of abandoned copper mine schemes and the starting of new ones, many of which present none of the foundations for permanent success.

The boom will be a positive injury to mining, by galvanizing into temporary activity mines in which millions have been sunk, and in which the new money will follow the old.

We would advise those who may be disposed to go into copper mining to get the assurance from disinterested, competent experts of practical experience, that the mines can put copper in market at an average cost, including interest on capital and sinking fund, at a figure that will enable them to compete with Lake at 12 cents in New York; for these are the figures they will probably have to meet in the not very distant future, and occasionally they may have to go below this.

The high prices that have been exciting the Metal Exchange for the past few weeks have been mostly confined to speculators. Manufacturers, always disinclined to buy largely this month, have, except in cases of absolute necessity, ceased to buy at all. They are, very naturally, unwilling to pay present rates, and will live from hand to mouth while these prices last, though it is quite possible they may last longer than the statistical position of the metal would justify.

The increased price of copper goods will at once lessen consumption in several directions, so that the enormous increase in this will suddenly be checked.

There is no ground for excitement, there is copper enough for all; and when the syndicate has unloaded its copper and its shares, we shall promptly see a drop. There are indications already that this is not far off, for we hear of heavy sales of copper at figures considerably below the nominal quotations on the Metal Exchange, and we know that offers of refined copper in Europe very far below the present Chili bar figures with £3 added for refining, have gone begging.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Oxide of Iron in Steel.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I find that Mr. Howe objects to the term "over blown burnt steel," and apparently fails to comprehend its meaning. Steel containing 7·4 per cent of iron oxide is certainly burnt steel; and I have distinctly said the metal was over blown. When carbon is oxidized, carbon is burnt, as in the case of ordinary fuel combustion. Similarly iron is consumed. Therefore, in the case above cited, although the steel is incompletely burnt—*i. e.*, not completely oxidized—this fact doesn't justify the rejection of the word burnt.

My method for determining iron oxide in steel or iron is simple, but appears to have escaped recognition.

Metallic iron is soluble in a saturated solution of potassic bichromate, acidulated with 10 per cent of sulphuric acid. The iron oxides are insoluble, consequently, on digesting steel in the above solution, the insoluble oxides may be collected and estimated by the usual methods. Mr. Howe does not appear to be aware that no quantitative determination of hydrogen in steel has been made; also, that iron ore steel evolves hydrogen even after ten days' continuous heating in vacuo. Therefore it seems premature to say, without further comment, that steel contains only a fraction of 1 per cent of hydrogen. Yours truly,

EBB VALE IRON AND COAL COMPANY, Nov. 28, 1887. JOHN PARRY.

Reply of Mr. H. M. Howe.

By referring to the paragraph beginning "18," 2d column, page 350, of your issue of November 12th, Mr. Parry will see that I did correctly interpret his meaning. I was and am surprised that he employs the word "burnt" as signifying oxidized. I will not say that this is incorrect: but I believe that "burnt" is now used by the great majority of metallurgical writers in connection with iron as signifying that the iron has undergone a certain structural change, due usually to abnormal treatment at a high temperature. Burning in this sense appears to be often accompanied by oxidation, but to be really a wholly distinct thing: and it seems probable that severe burning may take place with very little and possibly with absolutely no oxidation. To iron which has acquired oxygen I think the terms "overblown," "oxidized," or better "oxygenated" are now usually applied. However, we have more important things than mere words to discuss. I called attention to Mr. Parry's use of the word "burnt" solely because I could not be sure that I correctly understood him.

As to hydrogen, Mr. Parry's inference as to my ignorance is completely mistaken. I am quite aware that it has been quantitatively determined by two analysts, whose results will shortly appear in my work. I am further aware that there is room to doubt the accuracy of their methods. I am also fully aware of the protracted escape of hydrogen in Mr. Parry's renowned researches, to which all must attach great value, and which, as will shortly be seen, I have studied with profound interest. When later portions of my work appear, it will be seen that my remark touching hydrogen, on which Mr. Parry comments, is simply inserted to contrast this element with oxygen and nitrogen as constituents of iron. The subject of hydrogen will be treated at great length in subsequent chapters. As will be then seen, I do not consider it absolutely certain, but simply extremely probable that iron can retain but a fraction of one per cent. of hydrogen. Mr. Parry was evidently misled by supposing that the statement to which he refers was final, and not to be qualified by later discussion. H. M. HOWE.

Prize Competition for Bronze Alloys.—The Berlin Union for the Promotion of Industrial Activity have offered a prize of £150 for the most exhaustive critical summary of the bronze, red brass, and brass alloys, used or recommended for use in mechanical science, with a definition of their properties as regards resistance, ductility, friction at various temperatures, malleability, production of electricity, and the effects produced upon them by acids, sulphide of hydrogen, sulphuret of carbon, chlorine, and other substances of marked corrosive action met with in practical experience. Ordinary red brass and brass alloys are first to be critically dealt with, and then the various descriptions of bronze with reducing or other admixtures, such as phosphor bronze, manganese bronze, aluminium bronze, silicium bronze, or delta metal, and are to be contrasted with regard to their principal technical qualities. The experiments on which these critical remarks are to be founded should not only be carried out upon pieces of metal with uniform section, but also upon pieces in actual use, and not uniform in section and dimensions. The latter point is stated to be of special importance, as many alloys assume other properties when the casting pieces are thick, or when the thickness varies in the same piece. The comparative results of hammering and rolling have also to be dealt with. The Union reserves the right of granting the whole prize or only a part in the event of the foregoing conditions not being all fulfilled, provided the general object of the competition is attained. The competition is open until December 31st, 1887.

THE MINING DISTRICT OF SAN JOSE, MEXICO.

Written for the Engineering and Mining Journal by John Williams, Mining Engineer.

The mining district of San Jose is in the jurisdiction of San Carlos, State of Tamaulipas, Mexico, and is distant from the town of San Carlos about fifteen miles. The mail service and constant and direct communication with Monterey and the United States are by way of Linares, which is a city of considerable importance in the State of Nuevo Leon, and is about forty-five miles west of San Jose.

GEOLOGICAL FEATURES.

The mines are on the northern and lower part of the San Carlos range of mountains, where the geological formation is principally white and gray porphyry, with stratified lime lying to the north and west in the foot hills, and granite and syenite in the higher portion of the range to the south. This porphyry is broken at various points by the blue line, and in several of the largest veins and mineral deposits horses of crystallized lime appear.

HISTORY OF THE DISTRICT.

The district was well known to the Spaniards during their occupation of Mexico, and many mines in it were worked by them from about the middle of the last century and until the year 1810, when they were driven out, on the Declaration of Independence by Mexico. It was a "Real" or mining settlement of importance, as is evidenced by the ruins of many buildings and numerous large slag piles. Most of the mining during that period had, no doubt, as its principal object the extraction of copper, in which metal the surface ores of most of the veins are rich, and, being oxidzed, are easy to smelt. Tradition also gives almost or quite fabulous figures as to the richness of the copper bullion in gold, and it is very probable that the smelting then carried on had in many cases the double object of extracting the richer metal from the ore with the copper for separation afterwards, as is now practiced. In the course of making very many assays on the ores of this district, I have found almost without exception more or less gold in both the copper and silver ores. There are some small heaps of silver lead slag, and a few arrastras for gold milling and amalgamation. Five have been discovered so far, showing that they did not neglect the free milling gold ores; but, as will be readily understood by any one who has seen a Mexican gold arrastra, only high-grade gold ores could be worked profitably by such a method.

I have had occasion, for my own information, and in making examinations on behalf of the Government, to examine most of the old mines in the district, and have found them to be comparatively shallow, not so much from the giving out of the mineral, but from the change in its character, by becoming sulphuretted. In some instances where water was encountered, it must have been necessary to abandon the mines, as with the works in such bad shape it would have been impossible to make any headway against it with the inadequate means at their disposal. The greatest depth found was little over 200 feet, but as this was in one of the drowned out mines the actual depth could not be ascertained.

After the departure of the Spaniards, the mines were entirely neglected, owing to the ignorance of the Mexicans in methods of ore reduction, and the district has since been untouched until within the last two years, with the exception of some slight work and the shipment in 1860-61 of a few tons of copper ore to Liverpool. These shipments were stopped by the troubles following the French occupation of the country in the latter year.

The future of the district as a copper producer is hardly worth consideration, though with copper at 16 cents a pound, a small amount of matte could be profitably produced. The work of the past two years by three American companies has not developed any considerable body of copper ore, and it may be that the copper deposits in the veins are superficial and that the Spaniards successfully skinned the district of its rich and easily smelted ore. What is left is extremely silicious and to produce even a few tons of 30 per cent matte per diem would not average more than 8 per cent copper. There is one 30-ton Fraser & Chalmers water jacket plant in the camp, but not running at present, the company owning it having failed for want of funds, and what is equally disastrous, want of knowledge of their business.

THE IMOGEN MINING COMPANY'S WORKS.

The prospect of the camp becoming a producer from its low-grade free milling gold ore is brighter, the steady work done by the Imogen Mining Company, of St. Louis, A. W. Gifford, President, having developed a large body of free milling ore. The Vegonia vein, on which the Imogen property is located, is the largest and best defined in the district. The only point where the complete width of the outcrop is laid bare, is in the bed of the gulch where the storm water has uncovered it. Here its course is E. 15° N. and it measures 90 feet across. The formation is entirely porphyry, and the gangue of the vein quartzite and quartz porphyry, mineralized with magnetic oxide of iron and copper in various forms. The latter is chiefly confined to the west of the gulch or Vegonia property, which was one of the most extensively worked mines in former days, and now in the new works below the level of the old workings there is a fair showing of copper glance and erubescite.

The Imogen ground on the east of the gulch is practically virgin, for in consequence of the cropping showing no copper and but few colors of gold, the Spaniards neglected it. The St. Louis Company have done about 700 feet of work on this portion of the vein, and have developed some large and continuous bodies of ore. The first level is at 40 feet, and has been driven east on the vein 125 feet, all in ore (the last assay made from the face of this drift gave a return of $142 to the ton), and two cross-cuts in this drift show a width of 25 and 42 feet of ore. The shaft is down 80 feet, nearly all in ore. The company is now running a cross-cut tunnel to cut the vein about 100 feet below this point, and should the vein be of a satisfactory character at this level, a mill, with a capacity of 50 tons, will be at once erected.

I have at various times made a considerable number of assays of mineral taken by myself from the Imogen workings, with a general result showing from the surface a trace of gold, and from a depth of 10 feet to 80 feet low-grade pay ore in large bulk with frequent streaks and patches, running as high as $165 to the ton. What is more conclusive, however, as to the average value of the low-grade ore is the result of a mill-run by Messrs. Dermott & Duffield at their works in New York, which, upon a sample of a ton and a half gave a return of about $7 a ton. I was present during the sampling of the mine when the ore for this test mill-run was extracted and sacked, and there is no doubt that of the 3000 pounds sent there was about one third which a competent superintendent would never have sent to a mill, being vein matter from near the surface that I knew from frequent assays did not show more than a trace of gold. From all of which I believe the average value of the ordinary milling ore will be about $10 to the ton. This conclusion is confirmed by the results obtained by Professor Eberhardt, of the State University, Austin, Texas, who from two amalgamation tests upon similar ore from two other mines in the district, the "San Mauricio" and the "El Leon," got a value in the case of the former of $12 and from the latter $11. The conditions of working are most favorable: a fine climate throughout the year, good and cheap labor, cheap fuel and timber, and in most seasons no lack of water. I am satisfied that under good management, from the ore being in large bodies, and the possibility of placing the mill close to the mine and the already mentioned cheapness of labor and fuel, the mining and milling charges should not exceed $2.50 per ton.

LINARES, Mexico, December, 1887.

TRUE VIEWS OF COKING.

Written for the Engineering and Mining Journal, by F. Koerner, Mining Engineer.

In a paper read before the Ohio Institute of Mining Engineers in May, 1885, Mr. Fred W. Gordon expresses some thoughts on coke and coking which are so sound, and some of them have since been corroborated by actual tests, that it seems to me they should be more widely known through the JOURNAL. I quote as follows:

"The attempts to ascertain the coking qualities of coals nearly all result in failures. Sending a car or two of coal to a coking region demonstrates whether it could be treated by *their* practice; and it may often happen that it would not be to the interest of those to whom the coal is sent to make an unqualified success of the experiment. To erect ovens under the supervision of a *practical* coke maker can effect no better result. This *practical* man, so often harped upon, is but the imperfectly taught *machine* of perhaps a bygone intelligence, whose art has been transmitted to him as a legend, and is as much mixed with superstition. He may be capable of repetition of manipulation to practical perfection, *but intelligent deviation is beyond his sphere.* Those who depend upon *practical* men may succeed when *nothing new* is essential, and where nothing new is desired. But where a (new) proposition is to be mastered, he is the worst of all appendages, as his prejudices interfere *to check a possible thought.* Those who trust to the *practical man* are always themselves ignorant, and fear to treat with intelligence beyond their ken. They accept the *machine* instead of the constructor, simply because they can not detect the impostor. . . . Practice *must* be based upon theory, or it is the result of accident." . . .

"It is a fact that dry-burning coal, impossible to coke in any ordinary coking furnace, *is effectively and rapidly coked in the blast-furnace.* In a blast-furnace with 100 feet average area, 200 tons of coal are charged every twenty-four hours, and the coking operation *must be completed in eight hours* from the introduction of the fuel. It seems possible that in this operation we have the elements of a fine coking process." . . .

"Coals of much inferior grade to those of Ohio produce good coke in Europe, by using coke ovens having the heat of their gases applied externally to the coke chamber, either on the sides, roof or bottom, or any two of these; the coals, however, are always carefully crushed or washed." . . .

It will not be straining Mr. Gordon's words if we translate them as follows:

1. Unless the quality of the coal to be coked be carefully examined, and the proper means be adopted—which, as we have shown in former articles, vary widely—to coke them, the result must be failure, entire or in part.
2. The bee-hive man, from prejudice and want of knowledge, is incapable of varying the means.
3. Coal can, and therefore should be, coked in much shorter time than it is now done.
4. Very dry coals can be coked by proper means.
5. Coals of inferior quality can be made into good coke by applying heat externally to the retorts and by previous proper preparation.
6. To do the coking most effectively, the heat should be applied *continuously* throughout the process, especially toward the end.

From observation and experiment I have been for many years convinced of the correctness of Mr. Gordon's ideas; this is the case so thoroughly, that in a plant which I am now erecting they will be realized.

The coals to be coked in this experimental plant of six ovens vary in gases from 25 per cent to 44 per cent; some of the coals coke as readily as Connellsville; others are exceedingly dry, so that the result in the bee-hive has been total failure; the oven widths vary from 3 feet to 18 inches; the depths of the charges of the coal in the retorts may be varied until the most economical depths are ascertained; the heat resulting from the combustion of the gases is applied *continuously* throughout the process, because the gases from six or more of the ovens enter a common combustion chamber, and one half of the ovens being charged with coal, say in the morning, and the other half charged in the evening, practical uniformity of heat is the result; if it be found that to vary the heat, *i. e.*, make it less at the beginning and increase it toward the end of the process, it can be effected very readily by the proper position of the registers.

The doors of the ovens will consist of plate iron, lined with fire-brick, so secured that an air space intervenes between the plate iron and the lining, and the doors are removed bodily from the oven front; they will be strong, light, cheap and permanent.

The cokes resulting from the various experiments and from the various coals and mixtures of coals, will be thoroughly tested as to porosity and strength in the manner first indicated by Mr. John Fulton in his report on the subject, and the results published in the JOURNAL.

The experiments will embrace trials of the same coals washed, and as they may come from the mines.

JASPER, ALA., Dec. 9, 1887.

CIRCULAR DUMPING CAGE.

The accompanying illustrations show a very convenient and successful dumping cage introduced at the Chapin mine, Michigan, by Mr. Per Larssen, the well-known engineer of the company, who has courteously furnished us with the drawings.

The principle of this dump is readily understood. When the loaded car is standing on the cage the center of gravity is a little above the center of the circle, and it is very easy to start this revolving on the wheels which support it.

The load is discharged out of the top of the car, and at once the position of the center of gravity is changed, so that without stopping the cage completes its full revolution and stops in its original position.

The whole operation is very simple and quick in application, and is said to give no trouble in practice. The car is held in position by the angle irons running the length of the cage just over the car. The distance apart of the wheels on which the circular cage revolves affects the facility with which the cage is started, but only to a slight extent.

Among the advantages claimed for the circular dumping cage is the fact that the cars require no doors, being emptied by turning them bottom up, and they are consequently cheaper to build and more durable. On the other hand, there is at times a decided advantage in having cars with doors, for large lumps of ore can be easier loaded through the end than over the sides.

Our readers will be grateful to Mr. Larssen for this contribution, and the more so because there is no patent on the device, it having been used in Germany, where Mr. Larssen witnessed its operation.

THE DEVELOPMENT OF THE AMERICAN CHEMICAL INDUSTRY.*

By Dr. Francis Wyatt.

(*Continued from Page* 433.)

NEW YORK.

This State has been celebrated for its production of pure salt ever since the latter end of the last century, and the energetic manner in which its resources have lately been investigated, has served to demonstrate that when fully developed it should be able to supply not only the immediate requirements of its surroundings, but all that may be needed for our entire consumption for many centuries.

In addition to the Onondaga district at Syracuse very large quantities are now raised in Wyoming, Genesee and Livingstone counties, and at East Gainesville and Phelps.

The Onondaga salt spring reservation is divided into four sub-districts, Syracuse, Salina, Liverpool, and Geddes, the brine being pumped and distributed by the State to the local manufacturers in consideration of a royalty of one cent for every 56 pounds, or one bushel, of finished salt. The pumping arrangements consist of an opening in the ground of say 12 to 15 inches in diameter, into which is lowered a wrought-iron pipe about $\frac{1}{4}$ of an inch thick, its lower extremity being pierced at the sides with a number of perforations to facilitate the passage of water. Within this pipe a second tube is lowered, having an outer diameter some 3 or 4 inches less than the interior diameter of the first one. This inner tube serves for pumping the brine, and, after being made properly secure, is provided at the bottom with the necessary snare holes. In the majority of the reservation wells the brine rises naturally to within 20 or 22 feet of the surface, and is lifted thence by ordinary plunger pumps, which force it into an air vessel for the purpose of distribution. In some of the outside wells, particularly in the most western portion of the State, where the water remains at a very low level, the pumps are provided with a bucket and clack. In all cases where there is an insufficient natural flow of brine into the wells, fresh water is forced down the outer tube, and, after saturation, is either pumped up again through the inner pipe, or if there happen to be two wells in sufficiently close proximity to communicate, the fresh water is passed down the one and the brine brought up from the other.

According to Prof. J. S. Newberry, who has made the subject his special study, the whole of these deposits occur in one geological formation and constitute a part of the Upper Silurian system, appearing to arise from the deposit of a salt lake that once occupied Central and Western New York, Northern Pennsylvania, Northeastern Ohio, and Southern Ontario, and was probably as great in extent as our Lake Superior. Great sheets of gypsum and rock salt were deposited in this lake as the water slowly evaporated, besides shales, marls and impure limestones.

At its northern margin, about Goderich, Canada, rock salt has been found in a number of wells, in beds varying in thickness from 2 to 70 feet, interstratified with lime and gypsum.

At its western border, at Sandusky, Ohio, the entire sediment is not more than 40 feet thick, and is principally composed of gypsum.

At Syracuse the salt, as we have seen, is not obtained directly from the Salina formation, but from brine pumped from wells that penetrate a great mass of sand, gravel, etc., that fills one of the old buried channels, formed when the continent stood higher above the ocean than now, and before the ice period, when they were to a large extent choked up and obliterated.

The old channel of Salina cutting across this strata received the drainage from deeply buried beds of salts lately discovered by borings in the southern parts of the State. As salt is very soluble, the rain falling on the surface and penetrating the rocks has gradually dissolved these beds to form brine, which, flowing down to a lower level, has filled the reservoir formed by the old channel.

Nothing could be more interesting than the diversity of composition existing in the salt deposits of the Salina groups, some being almost chemically pure, while others, like the brines of Michigan, contain a large proportion of the objectionable chlorides, which form the "*bitterns*" of the salt boilers.

To account for this divergency we must remember the varying conditions which governed the precipitation of the salts originally held in solution by the great salt lake, and foremost among which were gypsum, chloride of sodium, sulphates of soda and magnesium, and chlorides of calcium, potassium, and magnesium.

As we have already explained in connection with the evaporation of sea water, the precipitation of all these salts takes place in the inverse order of their solubilities, so that at a given moment only the most deliquescent of them remain in the mother liquor, and these, as we all know, have such an affinity for water that they are never found in nature save in solution, and even when they are artificially dried, they rapidly return to a liquid state if exposed to the air. These facts enable us to readily understand that where a land-locked basin receives the drainage of the surrounding country, the water by evaporation and concentration becomes salt.

Upon further concentration the least soluble of the ingredients would be the first to fall, and thus a deposit of gypsum might be formed, while all the other salts remained in solution, until, by still further evaporation, the saturation limit of sodium chloride was surpassed, and pure salt was in its turn deposited. By this time, the waters would have enormously decreased in volume—and, having concentrated themselves at the deepest parts of the basin—would finally disappear, leaving behind them *en bloc* the whole of the objectionable chlorides or "bitterns." The sediments of the great old lake would appear to have precisely this record, and hence the differences in the constitution of its brines when taken from various points of its interior.

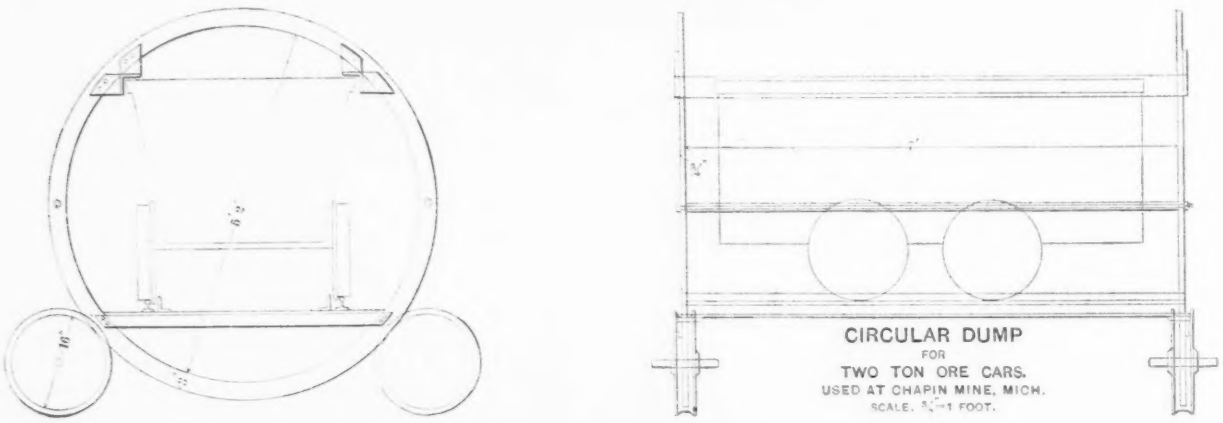
The Syracuse salt brine is at present pumped from a depression or hollowing out of the red shale, which may be compared with a deep ravine, extending from near the outlet of the Onondaga lake to the beginning of the Onondaga Valley in the Tully Hills.

This ravine is filled with a diluvial deposit or detritus varying from the coarsest gravel to the finest drift-sand, the layers of both alternating with layers of clay, without any distinct order or extent of deposition. Where the gravel has formed into a conglomerate it is remarkably hard, and has received the name of hard pan; but, like the two previous ones, this material is without any regular or persistent order, as has been sufficiently demonstrated in the many borings of wells on the reservation for the last thirty years. Thus, in some wells, from five to seven layers of hard-pan have been penetrated, having a total thickness of from twenty-two to twenty-seven feet, while in others, no more than seventy feet distant, only one to two thin layers were found.

The shale everywhere forms the bottom of this ancient excavation, and has been found in every instance where the boring was continued below the brine-bearing diluvial deposit or drift masses. The depth of the excavation is from ninety to five hundred feet below the level of Onondaga Lake.

Numerous observations, made during the last twenty years, have established that the shallow wells when drawn to their full capacity, lose in strength from 15 to 25 degrees of the salinometer (one degree salinometer is equal to about one-quarter per cent of salt) within a comparatively short time. On the other hand, the deep wells suffer no such reduction in their strength, but their supply is more limited, and it is hence concluded that their brine is not subject to the infiltration of weaker brines, while that of the shallow wells is especially so when more than a certain limited quantity is drawn from them in a certain given time.

In sinking a number of deep wells at short distances from each other, in the direction from south to north, it has been found, after pumping them for a short time, that the well most south and deepest yields the largest amount of brine, and hence it is presumed that the quantity of



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NEW YORK BRINE WELLS AND SALT DEPOSITS.

Name of district.	Material traversed.	Feet. Average.	Analysis of Brine.
Onondaga. Syracuse. Salina. Liverpool. Geddes.	Diluvial deposit from coarsest gravel to finest sand, alternated with "hard pan," down to the "red shale."	356 to 450	Average for last ten years. Salinometer 72°. NaCl 17·350; $CaCl_2$ 0·336; $MgCl_2$ 0·141; $CaSo_4$ 0·263; MgBr Traces; H_2O 81·910
	Average depth of wells now working in the district	350 to 450	
First attempt at deep boring in 1838. Syracuse.	Blue and red shales, Niagara limestone reached fresh water in Clinton epoch	600	
Second attempt, 1867, at Liverpool.	Niagara limestone, 31 feet	394	291 Feet. 540 Feet.
	Soft limestone	32	NaCl 2·940 4·547
	Hard blue bituminous limestone	64	KCl 0.147 ....
	Soft blue clayish shale	11·2	$CaCl_2$ 3·637 5·869
	Hard blue clayish shale	11	$MgCl_2$ 1·232 2·023
	Light gray shale	72	CaSo 0·156 0·107
	Green shale	30	Solids 8·122 12·546
	Total depth	715	
Third attempt, 1867, at Canastota.	Red and blue clays	300	NaCl 15·228; $CaCl_2$ 4·820; $MgCl_2$ 0·928; $CaSo_4$ 0 005; Carbonates 0 015
	"Hard pan" loose gravel and sand	348	
Fourth, 1881, at Jamesville, by Solvay Process Co.	Total to reach hard rock	648	Solids 20·996
	Tools lost and work abandoned at	1,040	
Fifth, 1882, at Cardiff, by Solvay Process Co.	Abandoned owing to bending of the well tube at about	1,000	
	Similar strata to second	705	
	Mixed shales	10	
	Green shale	45	Salinometer 90°.
Sixth attempt, 1882, at Cedar Vale, by The Solvay Process Co.	Red shale	45	NaCl 17·200
	Green shale	12	$CaCl_2$ 3·666
	Red shale	11	$MgCl_2$ 0·850
	Green shale	12	$CaSo_4$ 0·231
	Shale and sand	20	Fe_2O_3 0·053
	Red shale	5	
	Green shale	25	Solids 21 700
	Red shale	261	
	Total depth	1,151	
Seventh attempt, 1884, Syracuse. Fifty feet above the Oswego and 30 feet above the Erie Canal, or, say, 400 feet above sea level. By Thomas Gale.	Ordinary formation	405	
	Red sand (1st salt water)	117	
	Niagara limestone	5	
	Hard magnesian limestone (2d salt water)	5	
	True limestone	73	
	Shales of various kinds	371	
	Clinton iron ore	10	
	Shales of various colors with sand	19	
	Light to dark gray quartz, beginning Medina sandstone	12	
	Sandstone and quartz	160	
	Brown and red sandstone, with white sand and streaks of black shales	165	
	Reddish gray sandstone (3d salt water)	53	
	Fine and coarse, red and brown sands, with some green shale (4th salt water)	105	
	Reddish brown, fine sand	100	
	Total depth	1,600	
Eighth and *last* attempt, 1884. Onondaga Creek, by New York State; 2000 feet below level of Erie Canal; 1600 feet below sea level.	Ordinary formation down to Niagara limestone	578	
	Various magnesian and bituminous limestones and shale down to true limestone	72	
	Various shades of shale and limestone down to the Clinton iron ore	345	
	Shales and magnesian limestone to first appearance of quartz	10	
	Shales of various colors—mixed with quartz grains down to *Medina* sandstone	70	
	Various colored sands, down to red sandstone	100	
	Various colored and alternating sandstones mixed with clay—and blue and black slates, with streaks of carbonates, sometimes predominating	794	
	Total depth	1,969	
Wyoming Valley.	Black slates	300	
	Limestone	5	
	Light colored shales, changing to dark at lower depths	345	
Type of various borings.	Corniferous limestone	140	
	Drab colored limestone and shales with gypsum	470	
	Salt	70	
	Red shales, etc	200	
	Total depth	1,530	
Warsaw Valley.	Diluvial deposit	17	
	Shale and slate	1,028	
	Hamilton limestone	148	
	Shales, various	75	
Dr. Gouinlock.	Upper and lower Helderberg	300	
	Shales, various	45	
Type of various borings.	Shale and salt	37	
	Main salt bed	68	
	Total depth	1,718	
Genesee Valley.	Blue clay	64	
	Slate and gravel	46	
	Blue limestone	136	
	Corniferous limestone	150	
	Black slate	44	
	Gray limestone and shale	416	
Pifford.	Rock salt	18	
	Saline shales	40	
Type of various borings.	Rock salt	53	
	Shale	28	
	Rock salt	58	
	Shale	9	
	Rock salt	52	
	Total depth	1,114	

	465 Feet.	532 Feet	1,395 Feet	1,500 Feet.
NaCl	7·19	10·58	15·62	16·12
$CaCl_2$	10·06	9·81	8·66	8·76
$MgCl_2$	4·63	4·16	1·45	1·66
$CaSo_4$	0·04	0·03	none	none
Fe_2O_3	0·09	....	....	....
	22 01	24·88	25 73	26·55

All too impure for use in the economical manufacture of salt

No brine was obtained from this well.

Rock salt.

NaCl	97·026
$CaCl_2$	0·543
$MgCl_2$	0·162
$CaSo_4$	1·253
Insoluble	0·105
H_2O	0·911
	100·00

Brine.

NaCl	25·71
$CaCl_2$	0·13
$MgCl_2$	0·05
$CaSo_4$	0 44
Total solids	26 32

Rock salt.

	900 feet.	1000 feet.
NaCl	97·44	98·28
$CaCl_2$	0·16	0·03
$MgCl_2$	0·07	0·08
$CaSo_4$	1·50	0·53
Insoluble	0 84	0·83
H_2O	0·19	0·22
	100·09	100·00

brine of the highest strength is limited in a certain locality, and that the direction of the brine veins in the ancient valley of erosion, is from south to north.

The brine in the tubing of the wells on the reservation stands lower in the strong wells and higher in the weaker ones, according, as it seems, to its respective specific gravity.

That of the strong wells does not increase in strength when not pumped during winter, while that of the weaker ones increases considerably when at rest.

When sinking a new well one or more layers of the so-called "hard-pan" and a thick layer of coarse gravel below are certain indications of abundant brine, but when this "hard-pan" is wanting, the well soon becomes filled up with sand and must be abandoned.

From the old State superintendent's reports between the years 1840 and 1850, it is evident that when the wells were sunk at Salina and Syracuse, below 250 to 300 feet, the brine of the Liverpool wells (at that time the strongest) decreased so much in strength and quantity that they had finally to be abandoned. This indicated, even at that time, that the same vein of salt water had been struck at Salina and Syracuse, and that the source of the brine must have come from the south.

The constancy and unvarying strength of deep wells year after year, taken together with the fact that 400,000,000 bushels of salt, or over 11,000,000 tons, have actually been extracted since they were first discovered should be sufficient to prove that the brine takes its origin in the south from a large bed of rock-salt.

The annexed details relate to the various borings that have been made, not only as at Syracuse but at other parts of the State, with the object of discovering the actual position and extent of this rock-salt bed, many authorities having maintained that it would be found beneath the wells of the Onondaga reservation, good brine from which has not been hitherto yielded at a greater average depth than from 350 to 450 feet.

(TO BE CONTINUED.)

CAST-STEEL ANCHORS.

The members of the committee appointed by the English Board of Trade to consider the measures that should be taken to provide proper regulations for the testing of cast-steel anchors have now presented their very complete and voluminous report. In substance they conclude that the material known as cast-steel, if of good quality and temper, is a suitable and good material for the manufacture of anchors. They are informed that of those already in use in the merchant service, after having undergone the preliminary and tensile tests, none have been reported as having failed. They are, however, satisfied that effective steps are absolutely necessary to prevent other and unsuitable cast material from being used in the manufacture of anchors under the guise of "cast-steel," and that suitable "preliminary tests" are sufficient to attain this end.

These preliminary tests should in all cases be made before the tensile strain is applied, and as they are of such a nature that they can be most conveniently conducted on the manufacturer's premises, and as the several parts of a cast-steel anchor should be tested before any large amount of labor or machining has been put upon them, arrangements should be made to give makers the option of making the tests at their own works under official supervision. The evidence that the superintendent of a public testing-machine shall accept as satisfactory that an anchor submitted for test at a public proving-house is really a "cast-steel" anchor shall be a certificate signed by the inspector (appointed by the Board of Trade, or by Lloyd's Register) in such form and with such particulars as the Board of Trade and Lloyd's Register may decide, that the preliminary tests formulated in Appendix A have been conducted at the maker's works, in his presence, and have been satisfactorily withstood.

APPENDIX A.

Preliminary Tests Recommended by the Committee.

Given weight.	Given height.
15 cwt. and below.	15 feet.
Above 15 cwt.	12 feet.

1. *Percussive Test.*—Anchors, or when anchors are made of more than one piece, each piece shall be subject to this test, as follows:

The anchor or piece shall be raised the given height for the given weight, and shall be dropped on an iron slab. The given height means that the lowest part of the anchor or piece when suspended shall be at least the given height above the iron slab on to which it is to be dropped.

2. An anchor of the Admiralty pattern shall first be raised vertically to the given height with its shank and arms in a horizontal position, and shall be let fall from that height.

3. It shall then be raised a second time to the given height, and shall be suspended with the crown downwards. Two iron blocks shall be placed underneath it, and it shall be let fall from this position so that one of the blocks receives it on the middle of one arm, and the other block receives it on the middle of the other arm.

4. The slab for the horizontal test shall be of steel or iron well laid on a solid concrete foundation to the satisfaction of the inspector.

5. If the slab on which the anchor falls is broken the test shall be repeated until a slab is made that does not break.

6. The blocks for the vertical test shall be solid, and shall be of sufficient height to prevent the crown of the anchor from touching the slab, and shall be otherwise to the satisfaction of the inspector.

7. *Hammering Test.*—When the percussive test has been passed successfully, to the satisfaction of the inspector, the anchor or piece shall be slung and freely put to a hammering test, as follows, that is to say, it shall be well hammered over its parts with a sledge hammer weighing not less than seven pounds, and shall be required to give under this treatment such a clear ring in all its parts as shall satisfy the inspector that the casting is sound and without flaws existing either originally or developed as the result of the application of the preceding percussive tests.

8. *Bending Test.*—Cast steel may be passed as sufficiently ductile for anchors when a piece of each casting 8 inches in length is cut from the casting, turned to 1 inch in diameter, and is then bent cold by hammering through an angle of 90 degrees over a radius of 1½ inch, without showing signs of flaw or fracture.

9. There must be a piece cast on each cast-steel anchor, or on each

portion of such anchor when it is made of more than one casting, and such piece must be of sufficient size to enable one test piece of the size before stated to be cut out of it, or it may be (at the discretion of the manufacturer) of sufficient size to enable four test pieces to be cut out of it. If it is only of sufficient size to enable one test piece to be cut out of it, that piece shall be subjected to the bending test named in paragraph 8; and, if it fails to withstand it, the casting is to be condemned. If the piece is large enough to enable four test pieces to be cut out of it, these four test pieces shall be disposed of as follows; that is to say, one of them shall be turned in a lathe to 1 inch in diameter for a length of 8 inches, and bent cold through an angle of 90 degrees over a radius of 1½ inches, and, if it withstands this test without flaw or fracture, shall be deemed to have withstood a satisfactory test for ductility. If the one test piece does not pass this test, all or any of the other three test pieces may be tested in a similar manner, and if any one of the four test pieces passes this test the anchor or part of the anchor, as the case may be, shall be deemed so far satisfactory.

10. *Annealing.*—Each anchor must be properly and sufficiently annealed, and when so annealed shall be stamped "annealed steel." Annealing is not to be regarded as proper or efficient unless the process extends from three days for small anchors up to six days for large ones.

THE SULPHUR-DEPOSITS OF SOUTHERN UTAH.*

By A. Faber Du Faur, New York City.

At the request of some of the members to whom I have shown a collection of specimens of sulphur from Southern Utah, I herewith present some notes relating to the mines and the method of extracting the sulphur from the ore. In preparing these notes I have borrowed from a paper by Prof. G. vom Rath, published in the *Neue Jahrbuch fur Mineralogie*, Vol. I., 1884, dated Salt Lake City, December, 1883.

The Cove Creek sulphur bed, now worked by the Dickert & Myers Sulphur Company, is in Beaver County, near the line of Millard County. It was first discovered by Mr. Ferdinand Dickert in 1869; other beds in the same neighborhood were found by him from 1872 to 1875, making altogether 22 mining claims. The want of railroad communication prevented the early development of these claims; but in 1883 Mr. F. Dickert put up a plant for extracting sulphur from the ore, which proved a perfect success; and in 1885 the property was transferred to a stock company organized under the laws of Utah

The railroad station nearest to the Cove Creek mines is Black Rock, on the Utah Central Railroad, 204 miles south from Salt Lake City, and about 26 miles west of the mines. The road from Black Rock to the mines passes through desert and lava-bed, to the road leading from Kanosh to Beaver, which latter road it joins near Cove Creek fort, a square stone inclosure, erected by the Mormons for protection against the Indians. Cove Creek fort is situated near the eastern end of a plain bounded on the west at a distance of about 12 miles by the Mineral Range, and on the east by the Sulphur Mountains, forming part of the Tushar Mountains. To the northwest the plain runs into the Sandy Desert. About three miles from the fort rises a solitary hill about 1000 feet above the plain, which Prof. vom Rath considers an extinct volcano, and to which he gave the name Mount Dickert.

There are in the neighborhood of Cove Creek fort several sulphur claims; for instance, the Mammoth, the Sulphur King, and the Excelsior. In the Mammoth claim, limestone and slate are impregnated with sulphur to such a degree that pieces as large as one foot in diameter consist almost exclusively of it, containing only fragments of the surrounding rock. Gypsum is likewise found as the product of the transformation of limestone. In the cavities, sulphur is found in small octahedral crystals. At the Sulphur King, decomposed andesite is impregnated with sulphur.

The Cove Creek mines are situated about two miles southeast of the fort and to the east of the Beaver road, in a small basin near the foot of Sulphur Mountains, surrounded by low hills, with a narrow ravine opening in the west-northwest direction into the plain. The basin is about 6000 feet above the level of the sea, while the Sulphur Mountains to the east rise about 2000 feet higher. The hills surrounding the basin consist mainly of andesite, partly also of a very light white trachyte, which is used as a building-stone at the sulphur works. Obsidian splinters are scattered over the surface of the hills.

As far as explored, the sulphur bed extends at least 1800 feet by 1000 feet, and the quantity of sulphur contained therein was estimated by Prof. vom Rath, at a time when the bed was not as fully exposed as it now is, to be at least 1,300,000 tons.

A curved cut has been made through the sulphur bed near its western end, exposing a vertical wall of rich yellow sulphur, 34 feet high. From this cut a track leads to the dump above the smelter, a short distance to the west. The sulphur extends up to the surface over part of a basin, but is mostly covered with sand or rather decomposed andesite. The surface of the deposit is wavy, giving the impression of an agitated mass gradually cooled. The sulphur is partly mixed with sand or gypsum. Most of it is of yellow color, while some of it is dark gray, and is called "black sulphur." In the cleavages and cavities, very beautiful crystals of sulphur are found. It would appear that large masses of sulphur were thrown to the surface, penetrating and enveloping the loose surface material, while at the same time vapors and gases passed through the semi-liquid mass during the process of cooling. The deposits of pure sulphur partly resemble the so-called "virgin rock," which is found as a product of distillation in the sulphur-flower chambers, particularly when distillation goes on too rapidly. Some also resemble the delicate crystals found on the walls of such chambers; others are like the crystals formed in slowly-cooled masses of sulphur. Gases escape in many places in the cut and in the prospect holes, together with water holding salt in solution. At some points also a considerably elevated temperature is observed.

The plant for extracting the sulphur from the ore and for preparing it for the market consists of four steam smelters, two grinding-mills, two retorts, and a chamber for making flowers of sulphur, and apparatus for making roll sulphur.

The capacity of the four smelters is 10 tons of crude sulphur per day; but so far the production has only reached about 1200 tons in one year.

The sulphur is extracted from the ore by liquation, the smelters being cast-iron cylinders, into which the ore is charged and steam admitted. The charge rests upon a cast-iron grating, supported by a steam-jacketed kettle, into which the sulphur runs and from which it is tapped. The ore is charged through a manhole at the top, while the residue, which is retained above the grating, is removed through a lateral manhole. The sulphur from the kettles is run into molds.

The plant for flowers of sulphur was erected last winter.

The greater part of the sulphur from the smelters is ground fine and shipped in bags of 100 pounds; the flowers of sulphur are also packed in bags. During the year ending May, 1887, over 1100 tons of ground sulphur were sold.

The great obstacle to the full development of this new industry is the cost of bringing the product to the market; but it is hoped that within a short time a railroad will pass within a very short distance from the mine, whereby the great expense of hauling to Black Rock will be saved.

* A paper read before the American Institute of Mining Engineers at the Utah and Montana meeting, July, 1887.

MODERN AMERICAN METHODS OF COPPER SMELTING.

Mr. A. Van der Naillen, President of the School of Practical Civil, Mechanical, and Mining Engineering at San Francisco, Cal., in a letter dated November 23d, says: "It is with much satisfaction that I perused Dr. Peters's book, American Methods of Copper Smelting. I find it thorough, covering the entire field, giving ample details of construction, clear explanation of the various processes of working the ores, in fine, it is just the book I like to recommend to my students."

The *Journal of the Franklin Institute* for December has a review of Dr. Peters's books, signed P. F., the writer no doubt is the well-known scientist Dr. Persifor Frazer. From it we take the following: "Dr. Peters has devoted a great part of his busy and useful metallurgical life to the study of copper smelting, and there is no one better able to speak on that subject than himself. The writer of this review enjoyed three years of his companionship at the School of Mines in Freiberg, Saxony, and has had the pleasure of meeting him afterwards at long intervals at Black Hawk, in Colorado, and at the Ely copper mines in Vermont. Wherever Dr. Peters was busy, he was accomplishing much good, and he has usually been busy.

"The nucleus of the volume appeared in the ENGINEERING AND MINING JOURNAL some time ago in serial form, but it shows every sign of the most careful preparation and intelligent arrangement.

"Chapters IV., V., and VI. are especially recommended to the copper metallurgist, as they contain a large amount of personal experience of Dr. Peters on a subject to which he has devoted particular attention, and of which the results will not be found elsewhere so concisely and intelligently stated. This is equally true of the following forty-one pages on the calcination of ore and matte in a finely-divided condition; and of the fourteen pages (Chapter VIII.) in which the chemistry of this process is treated. Altogether the book is a valuable addition to metallurgical literature and will be appreciated both by the student and the practical smelter."

Collection of Foreign Coins and Medals —The Superintendent of the Mint in Philadelphia, Pa., has increased the collection in the Mint of coins and medals from foreign countries, and has lately secured a set of gold and silver Jubilee medals, struck in commemoration of the fiftieth anniversary of the coronation of Queen Victoria, and a collection of over 700 medals from the Roman Mint, illustrative of incidents covering a period as far back as 75 years prior to the discovery of America.

Copper-Coated Carbons.—A meeting of carbon manufacturers was held at Cleveland last week, and a combination was formed by the companies represented, for the purpose of joining hands with the Faraday Carbon Company, of Pittsburg, in defense of the suit brought against that company by the Brush Electric Company, in regard to the manufacture of copper-coated carbons. It is reported that all the manufacturers, outside the Brush, will "pool their issues" in this matter.

The Metric System.—This system is to be introduced into the Province of Finland. Yet the United States still holds back and stops the road of progress. We still cling to our dozen different bushels, and our half dozen different tons, and our different ounces, and our absurd measures of all kinds. But until some "Trust" can get a corner on the metric system or in some other way see a lot of "boodle" in its introduction, it seems the whole people is to spend millions struggling with the accidental so-called system now in use.

The Value of the Engineering and Mining Journal to the Profession.—A prominent mining engineer of the West writes us: "I can indorse the good word said about the JOURNAL. I am proud to say that a great part of my mining education was received from the ENGINEERING AND MINING JOURNAL, and hence I shall always be found among its friends. Some time ago I wrote a letter to the JOURNAL about some property in the West. This letter has been of great service to me by bringing me prominently before many persons who otherwise might never have heard of me. It brought me many letters from persons both in this country and abroad."

A New Use for Dynamite.—A French officer of engineers has been making use of the expansive force of dynamite to repel the water which infiltrates into excavations. He finds that a charge of several cartridges exploded at the bottom of a hole some 9 or 10 feet deep in the wet ground drives back the water to a distance of 4 or 5 feet from the sides of the borehole, and that, provided there be no great pressure of water, the sides of the excavation do not begin to weep till after the expiration of half an hour or more. This time is sufficient to allow the workmen to get in concrete, or to apply means for stopping back the water.

A New Porous Plate Storage Battery.—The porous plates used in the Desmazures accumulators used on board the electric launch which recently underwent trial at Havre, are made by subjecting to great

pressure a metallic powder obtained by chemically precipitating the metal. By this process solid plates are obtained having a specific gravity of only from one-third to one-fourth that of plates obtained in the usual way, and the porous character of the new material renders it capable of absorbing large quantities of oxygen or hydrogen gas, and it is, therefore, eminently suitable for the construction of secondary batteries.

The Great Lake Freight Record.—A marvelous record in lake marine annals was completed December 9th, by the big propellers Jewett and Tioga, belonging to the Union Steamboat Company, when both came into port together with flags flying and whistles blowing. They first left Buffalo together on the morning of April 26th. Each had completed 25 round trips and sailed 46,000 miles, the Tioga having delivered 85,000 tons and the Jewett 75,000 tons of freight during the season. During the whole time neither has had to lie to for a single day for repairs.

Diamonds in Meteoric Stones.—In a Russian paper appears a preliminary report of the examination by Latschinof and Jerofeif, Professors of Mineralogy and Chemistry, respectively, of a meteoric stone weighing four pounds, which fell in the district of Krasnoslobodsk, government of Penza, Russia, on September 4th, 1886. In thei nsoluble residue, small corpuscles showing traces of polarization were observed; they are harder than corundum, and have density and other characters of the diamond. The corpuscles are said to amount to 1 per cent of the meteoric stone. Carbon in its amorphous graphitic form has been long known as a constituent of meteoric irons and stones; lately, small but well-defined crystals of graphitic carbon, having forms often presented by the diamond, were described in our columns as having been found in a meteoric iron from Western Australia. "If this supplementary discovery be confirmed," says *Nature*, "we may at last be placed on the track of the artificial production of precious stones."

International Exhibition at Brussels, Belgium.—Considerable interest has been awakened among manufacturers and producers in the International Exhibition and Convention of Sciences and Industry, to be opened in Brussels May next. We have already referred to this exhibition in previous issues of the ENGINEERING AND MINING JOURNAL, but, since we have had inquiries from manufacturers in reference to it, we add the following information: The inducements offered American exhibitors are: 1st. Guarantee of the protection of industrial, scientific and commercial property. 2d. Transportation of goods for exhibition. 3d. Custom-house (free of duty). 4th. Insurance. 5th. Complete representation of all exhibitors guaranteed. The rates for space in the machinery gallery are, per square yard, $14. All machinery in motion at least four days a week and five hours a day will be allowed a reduction of 50 per cent from this price. All applications for space must be made by January 15th, 1888, and all entries by April 15th, 1888. All goods must be in their respective places by April 25th, 1888. All goods transported directed into the exhibition buildings by the Red Star Line at special rates. Messrs. Armstrong, Knauer & Co., of this city, are the authorized agents for the United States.

Trade Schools and the American Apprentice System.—Col. Richard T. Auchmuty, the founder of the New York Trade Schools, read a paper recently before the Polytechnic Section of the American Institute on "An American Apprentice System." After referring to the decay of the old apprentice system, caused by the sub-division of labor and the inability of the master mechanic to bestow much personal care on the apprentice, it was argued that the only method by which it was possible to train American mechanics who could compete with foreign workmen was a combination of the trade school with real work. To apply the same system of education to the trades as is now followed in the professions. Colonel Auchmuty maintained that this was "no paper plan devised in a study," but it was the result of the experience gained while instructing over one thousand young men at the New York Trade Schools, many of whom were now earning three or four dollars per day, and some of whom were master mechanics. Excellent specimens of plumbing work, of wood carving and stone cutting were exhibited, the result of one season's instruction. Attention was also called to a large west side apartment house, the brickwork of which was done almost entirely by Trade School graduates. Now that it has been demonstrated that trade schools could teach the American lad how to work, it rests with the master mechanic to give him employment. Two associations, the Master Plumbers and the Silversmiths, had asserted their right to do so, notwithstanding trade union rules to the contrary. The opposition of the journeymen, most of whom were of foreign birth, to allowing boys to learn the trades was attributable to their dread of competion and over-production. This was a groundless fear. The labor of young men who had been taught how to work would, if properly utilized, lower the cost of the product without lowering wages. Over-production came from high prices, not from people having too much. The tendency of trade union regulations in regard to production was to enhance prices, contract the market and to make the poor poorer.

Manufacture of Fluoride of Aluminium.—The preparation of aluminium fluoride and alkaline double fluorides thereof by mixing a solution of aluminium fluorine sulphate with—according to the product to be obtained—different quantities of alkaline fluoride, and subsequent evaporation, or heating, or melting and lixiviation, is thus effected by Mr. L. Grabau, of Hanover. A peculiar solution is obtained by treating a solution of sulphate of alumina or of alum with pulverized fluorspar, preferably in the heated state. The greater part of the sulphuric acid combined with the alumina (from $\frac{2}{3}$ to $\frac{3}{4}$, according to circumstances) is thereby replaced by fluorine, gypsum being simultaneously formed. The remainder of the sulphuric acid not replaced by fluorine is, however, by no means contained in the solution as sulphate of alumina mixed with the aluminium fluoride, which is soluble in water, as is shown by the fact that from the solution, even in a concentrated state, no alum can be obtained by sulphate of ammonia or sulphate of potash. The remaining sulphuric acid is apparently chemically combined with the aluminium fluoride, so that the solution can be designated an aluminium fluorine sulphate solution.

For the preparation of aluminium fluoride this solution is mixed with as much fluoride of an alkali as is equivalent to the sulphuric acid combined with the alumina and lime. This mixture is then evaporated and heated and lixiviated with water until the residue is free from sulphuric acid. This product is the richest in aluminium fluoride that can be obtained in the treatment of the aluminium fluoride sulphate solution. For the preparation of double fluoride of aluminium and sodium or potassium Mr. Grabau mixes with the aluminium fluorine sulphate solution as much fluoride of sodium or potassium as is necessary for converting all the aluminium into the double fluoride and the small quantity of dissolved gypsum into calcium of fluoride.

The precipitate is separated in a suitable manner from the by-products of the reaction, and either the whole mixture of aluminium fluorine sulphate and fluoride of sodium or potassium, or only the previously decanted precipitate, is suitably evaporated to dryness. The precipitate thereby becomes denser, and can be more easily washed out. The heating of the evaporated mixture is useless in the preparation of the ordinary double fluoride. If, however, double fluorides are to be obtained which contain for one molecule Al_2Fl_6 less than six molecules, NaFl or KFl, the evaporation to dryness, as well as subsequent heating or melting of the mass before the lixiviation, is indispensable.

The New Sjoberg Explosive.—An explosive which is prepared in a solid form, and contains neither nitro-glycerine, nitro-cellulose, nor nitro-benzine, has been invented by Mr. Rudolf Sjöberg, of Stockholm. It may not only be employed for blasting operations in mines and in quarries, but also in guns and for filling torpedoes. The preparation is carried out in such a manner that nitrate of ammonia is mixed with melted purified solid hydrocarbon, and is gelatinized with liquid hydrocarbon, or with only one or with more melted hydrocarbons. By means of the gelatinization, each particle of the salt is impermeably inclosed in a layer of gelatinous material, so that the hygroscopical properties of the nitrate of ammonia in the open air are prevented. Among the solid hydrocarbons he uses naphthaline, paraffine, and the like, and among the liquid hydrocarbons he uses purified paraffine or astral oil. In order to facilitata the explosion or discharge of the substance, and to increase its explosive power, he adds thereto finely powdered chlorate of potash either in its pure state or after it has been gelatinized in the same manner as the nitrate of ammonia. The salts treated in this manner when mixed together do not come into direct contact with one another.

It is stated that the explosive thus prepared has, at least, as great an explosive power as any heretofore ordinarily manufactured, and that it possesses a greater amount of safety than they, whether in the course of manufacture or when being transported or manipulated, the Sjöberg explosive being only capable of being exploded in an inclosed space, and by means of a strong fuse cap. When in its free or unconfined state, the substance never explodes, either by blows, fire, or even by the action of the fuse cap. The explosive is, moreover, thoroughly insensible to the action of cold. Other salts of ammonia may be used.

A modification of the process consists in the nitrate of ammonia gelatinized as described by means of hydrocarbon being mixed with whey (or cheesy matter, sugar of milk, or the like), obtained from milk, after the preparation has been subjected to treatment with two parts of nitric acid of 1·40 to 1·50 and four parts of sulphuric acid of 1·82 to 1·84 specific gravity to one part of the substance, the superfluous acids being removed by washing. The product obtained by this method is a gray powder insoluble in water, which can be easily exploded by means of a dynamite fuse cap, and can be used either as a substitute for chlorate of potash or alone as an explosive.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in another part of the Journal.]

Geology and Mining Industry of Leadville, Colo., with Atlas. By Samuel Franklin Emmons. United States Geological Survey. Volume XII. Published by the Government, Washington, D. C., 1886. Pages 747 and Index. Handsomely illustrated.

Anthracite Coal Regions of Pennsylvania. Report for 1886. By the Inspectors of Mines. Published by the State, Harrisburg, Pa., 1887. Pages 209. No Index. Illustrated.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

PATENTS GRANTED DECEMBER 13TH, 1887.

374,574. Quarrying Plug or Wedge. Matthew Bentely and John Bentley, Dudswell, Quebec, Canada.
364,604. Fish Plate Joint for Railroad Rails and Bearing for such Joints. William Lepsky, Bureau Junction, Ill.
374,617. Safety-Valve. Albert C. Meady, Somerville, Assignor to the Crosby Steam Gage and Valve Co., Boston, Mass.
374,618. Obtaining Ammonia from Manure, etc. William F. Nast, St. Louis, Mo.
374,651. Process of Purifying Iron. Joseph Beasley, Handsworth, County of Stafford, England, Assignor to John Howard Mitchell, Philadelphia, Pa.
374,679. Artificial Fuel. Jason I. Irving, San Francisco, Cal.
374,688. Steam Boiler. Nathaniel Metz, Lansdale, Pa., Assignor by mesne assignments to William D. Heebner, same place.
374,716. Manufacture of White Lead. Wm. P. Talbot, Brooklyn, N. Y.
374,740. Explosive Compound. Lucien G. Heusschen, Paris, France.
374,752. Valve-Gear. George M. Pelton, Belmont, N. Y., Assignor to William P. Clark and Charles E. Clark, same place.
374,770. Mode of Rolling Bars for Angle-Iron. John M. Baker, Allentown, Pa.
374,778. Electric Generator and Motor. Albert F. Congdon, Philadelphia, Pa., Assignor of two thirds to Isaac Schlicter and George E. Vickers, both of same place.
374,779. Gas Regulator and Cut-off. Charles A. Dally, Moon, Pa., and Harry K. Richardson, Detroit, Mich.
374,796. Packing. Jesse L. Law, Jr., New York, N. Y.
374,817. Prospecting or Boring Tube. Albert Ball, Claremont, N. H., Assignor to the Sullivan Machine Company, same place.
374,820. Machine for Recording the Revolutions of Ventilating Fans. Edmund Bartl and Frank Nichter, Scranton, Pa.
374,842. Safety Strip for Electric Circuits. Philip Lang, Pittsburg, and Oliver B. Shallanberger, Rochester, Assignors to the Westinghouse Electric Company, Pittsburg, Pa.
374,871. Electric Motor. William Hochhausen, New York, N. Y.
374,895. Coal Elevator. Thomas G. Goodfellow, Chicago, Ill.
374,900. Mining Machine. Benjamin A. Legg, Columbus, Ohio, Assignor to the Lechner Manufacturing Co., same place.
374,905. Rod-Packing. Frank Pinch, Sidney, N. Y.
374,908. Planing-Machine for Metal. William Sellers and John S. Bancroft, Philadelphia, Pa., Assignors to William Sellers & Co., incorporated, same place.
374,910. Regulation of Electric Motors. William Stanley, Jr. Englewood, N. J., Assignor to George Westinghouse, Jr., Pittsburg, Pa.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(*Continued from page* 435.)

DISCUSSION OF OPINIONS.—I intend to publish elsewhere a more elaborate statement of the replies received than would be appropriate here, and I will now indicate only a few points of possible importance.

In the case of locomotive boilers several believed confidently that steel was less corrodible than iron: but in case of marine boilers and hulls none were of this opinion: and in general the answers were more favorable to steel in the former than in the latter class. This appears to harmonize to a certain extent with the results of small scale tests, in which hot sea water appeared to be relatively unfavorable to steel.

Again, while several confidently believed that steel was the less corrodible, yet only one was decidedly of the opposite opinion, the three others who regarded steel as the more corrodible merely entertaining an impression, or at most a belief which was not a confident one, so far as could be inferred from their letters.

An exception to this is found in the case of steel when exposed to moist coal, in the tender of the locomotive: here two were decidedly of the opinion that steel corroded faster than wrought-iron, and another had the same impression, while no opinion to the contrary was expressed. The number who expressed this opinion was so small, however, that I attach no great weight to it, but rather regard it as suggesting further inquiry. It will be remembered that in our small scale tests steel was less corrodible than wrought-iron in acidulated water.

To my mind the most valuable opinion is that of Mr. Wm. Parker, whose position as chief engineer-surveyor of Lloyd's register gives very exceptional opportunities for observation. He states positively that steel is no more corrodible than wrought-iron.[a]

Several of those who stated that they found no difference in the corrosion of wrought-iron and steel in hot and cold sea water, qualified their statements by adding "provided the scale be first removed by pickling or otherwise" or words to that effect. There appears to be a belief that scale is more likely to be injurious to steel than wrought-iron, and many ship-builders habitually pickle steel plates on this account.

Two who did not think steel less corrodible than iron, yet believed that steel boilers outlived wrought-iron ones.

Although no question was raised as to the general merits of these two classes of iron, many asserted, and often in very strong terms, the very great general supperiority of steel over wrought-iron, and not a single opinion to the contrary was expressed, which is certainly striking, considering that I had no knowledge in general as to the views of the persons addressed, and hence exercised no selection, conscious or unconscious, in favor of either metal.

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[a] "Experience has proved that steel *does resist corrosion* equally as well as iron, and it is used almost exclusively in the manufacture of marine boilers." "Ninety-nine out of every 100 boilers constructed under the inspection of this society's surveyors are made of steel. In fact, the use of iron for marine boiler making is a thing of the past. The introduction of mild steel has allowed the working pressures of boilers to be more than doubled." Private communication, Aug. 10th, 1887.

Similar views are expressed by Mr. B. Martell, also of Lloyd's Register, who says (Trans. Inst. Nav. Architects, XXVII., p. 58, 1886) "constant attention has been given to this subject (corrosion) by the surveyors to Lloyd's Register, as the vessels have from time to time come under examination. The general opinion expressed by them is that, so far as corrosion is concerned, mild steel is not more injuriously affected than iron, provided the mill scale be first cleaned off the surfaces before coating the steel."

The very rapid increase in the use of steel for ship-building, and in the ratio of steel to iron vessels built, illustrated by the following table, goes to show that ship-builders and users no longer consider that steel is at a serious disadvantage as regards corrosion.

TABLE 47 D.—STEEL AND IRON VESSELS CLASSED AT LLOYD'S REGISTER.[a]

Year.....	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
Steel.. Number.....	7	9	23	23	63	109	92	118
Tons.....	4,470	16,000	85,873	42,407	125,841	166,428	132,457	165,437
Iron.. Number.....	435	348	355	452	525	644	515	260
Tons	517,692	470,969	459,994	696,724	851,075	933,774	661,201	290,429
Ratio steel : iron, tons ..	1 : 116·	1 : 29·4	1 : 13·	1 : 16·4	1 : 6·77	1 : 5·61	1 : 4·99	1 : 1·76

[a] Trans. Inst. Nav. Architects, XXVII., p. 55, 1886. The last line is calculated from the data there given. Vessels built on the continent, in America and the colonies are excluded.

From our small scale tests it might be expected that the contact of wrought-iron and steel, like that of any dissimilar classes of iron, would hasten the corrosion of one if not both. And in some instances this has been the case; it is sometimes the wrought-iron, sometimes the steel whose corrosion is accelerated. Thus Martell found that, after a year's exposure to sea water, the steel plating of a vessel riveted with wrought-iron had, in the immediate neighborhood of the rivets, corroded more than the rivets: while Denny reports that, in case of a steel vessel, the forgings and certain covering plates of whose rudder were of iron, the iron had corroded rather seriously, while the steel with which it was in contact had not corroded at all.[b]

§ 166 A. There is a belief that the best kinds of wrought-iron corrode more easily than the commoner kinds, and some of our small scale evidence supports this belief, but by no means conclusively. If there were a really important difference in favor of the common wrought-iron, then we should expect that it would nearly always corrode faster than the purer kinds, which is far from true. Mallet indeed found that the admirable Swedish and Low-moor wrought-iron corroded faster than the common varieties in sewage-bearing sea water and when exposed to the weather: but, on the other hand, in river water and pure sea water the reverse occurred. So, too, in Parker's experiments, in which two kinds of common and five of best wrought-iron were exposed to six different sets of conditions, while the mean corrosion of the common was less than that of the best irons under five of the six sets of conditions, yet the difference was always slight, from 5 to 17%, and in four out of these five sets at least one of the best irons corroded more slowly than at least one of the common irons. In the sixth set the common iron corroded slightly faster than the best. Were we to strike a mean of all of Parker's and Mallet's results, it might be in favor of the common irons: but, in view of the characteristics of our evidence, such an average carries little weight unless based on a vastly greater number of observations than we possess.

§ 167. INFLUENCE OF DIFFERENCE OF POTENTIAL.—The contact of more electro-positive substances, such as zinc, retards, that of more electro-negative ones, such as tin, lead, copper, magnetic and ferric oxides, accelerates the rusting of iron. Hence while galvanizing even if defective hinders the rusting even of exposed spots, tinning and coating with magnetic oxide probably greatly hasten the corrosion of unprotected portions. The difference of potentials between iron and nickel is so slight that nickel plating as such should not greatly affect the corrosion of exposed portions: but, when the iron is copper plated before receiving the nickel, the copper should greatly hasten the corrosion of the iron where the plating is imperfect. See § 168.

[b] Proc. Inst. Nav. Architects, XXIII., pp. 146-7, 1882.

A. *Galvanizing.* In lines 6 and 7 of Table 44 we note that galvanizing reduces the corrosion of wrought-iron under all conditions of exposure, by from about 60% in case of foul sea and pure river water to nearly 75% in case of foul river water, completely preventing it in case of exposure to the weather. Taking all the conditions together, the galvanized wrought-iron may be considered as resisting corrosion much better than even skin-bearing cast-iron.

B. *Segregations* within the metal itself, as already pointed out, probably greatly hasten corrosion, by creating difference of potential.

C. INFLUENCE OF MAGNETIC OXIDE.—The magnetic and similar oxides of which iron scale consists, whose stability is illustrated by the resistance of native magnetite, iron sands, etc., to the oxidizing action of the atmosphere, and of fresh and salt water even when periodically wet and dried by the tide for countless centuries, protect iron which they coat from oxidation, but hasten that of naked iron. Their protective action is shown in the comparatively slow rusting of Russia iron, of blued iron, and of castings which retain their original skin. An effective form is the comparatively thick coating of oxide produced on a very great scale by repeatedly heating iron to redness alternately in an atmosphere of carbonic oxide plus nitrogen and in one of mixed carbonic oxide, carbonic acid and nitrogen (Bower's process), or better still, by prolonged heating to redness in steam, which, though it acts more slowly, is said by some to create a more tenacious and impervious skin (Barff's process). The coating of oxide produced in this way under favorable conditions is impervious, adheres well, and is a powerful protection.[a]

All the parts of the Springfield United States rifles, excepting those which are case-hardened, the barrels and the lock parts, are coated with magnetic oxide by Buffington's process of suspending them for five minutes or more in pure molten niter containing manganic oxide, at a temperature sufficing to ignite sawdust.[b] It was for a time applied to gun barrels also, but even the very moderate temperature employed sometimes twisted them.

It has however been repeatedly shown that iron scale is strongly electro-negative to iron, and that, while it hinders the corrosion of those portions of the iron which it actually covers, its presence greatly hastens the corrosion of naked iron, whether in adjacent portions of the same piece or in separate pieces with which it is galvanically connected. It thus acts like copper, but less intensely. Andrews, immersing in confined cold sea water bright plates of wrought-iron, cast-iron and steel, each coupled galvanically to a similar but scale-bearing plate, detected by the galvanometer a rapidly diminishing electromotive force, from about one third to about one fourth of that existing under like conditions between similar bright plates and copper plates.[c] In experiments in Portsmouth Harbor, England, the galvanometer showed active galvanic action between scale-covered and naked portions of the same plate immersed in sea water. When cylinders of naked and Barffed (*i. e.* artificially scale-coated) iron, galvanically connected by platinum, were immersed by J. H. Kidder in pure sea water, a decided current was indicated by the galvanometer.[d]

In Andrews' experiments, which I here summarize, contact with scale-bearing plates appeared to about quadruple the corrosion of bright plates, affecting it about three fifths as much as contact with copper plates did. Note, in these harmonious results, that contact with scale-bearing plates hastens corrosion in every case, increasing it from 3·3 to 4·7 fold. To facilitate comparison I have reduced the results to a uniform time of exposure of one year.

TABLE 48.—INFLUENCE OF IRON SCALE: CORROSION IN CONFINED COLD SEA WATER. ANDREWS.

Number.	Metal.	Loss of scaleless steel and iron by corrosion, per square foot of surface per annum.				
			Immersed in galvanic circuit.			
		In simple insulated immersion, 56 weeks.	Each plate connected with a bright wrought-iron plate 56 weeks.	Each plate connected with a similar but scale bearing plate.		Each plate connected with a copper plate for 16 weeks.
				For 4 weeks.	For 16 weeks.	
1	Wrought-iron.....	·015	...	·058	053	·113
2	Soft Bessemer steel.	·014	026	·052	·059	·103
3.	Soft open-hearth " .	·017	027	·051	·073	·074
4.	Soft cast steel... ...	·020	·027	·049	·081	·109
5.	Hard Bessemer steel	·018	·025	082	·060	·111
6.	Hard open-hearth "	·016	·019	·067	·076	·117
7.	Cast-iron	·021	·030	·068	·086	·122
..	Mean.	·017	·026	061	·076	·107

Bright and scale-bearing discs, cut from the same plates and each completely insulated, were exposed by W. Parker under identical conditions for from 38 to 65 weeks to London air, cold sea and bilge water, and in marine boilers, each set containing 22 discs (lines 23 to 33, Table 44). During exposure the scale-bearing plates lost part and in some cases all their scale. The degree to which the remaining scale hastened the rusting of the portions thus left exposed was estimated by dividing the total loss of weight per square foot of finally scaleless surface, by the total time of exposure. This however brings the apparent much below the true influence of the scale: for much of the scale doubtless fell off some time after immersion began, so that actually much less than the total time of immersion was available for the corrosion of the portions thus left bare. But even if we make no allowance for this exaggeration of the apparent time, the corrosion of the naked portions of these plates still appears on the whole greater than that of the scaleless plates. In the case of exposure to London air and of the marine boilers without zinc this exaggeration of the apparent time of exposure masks the effects of scale. I here condense his results.

TABLE 49.—RATIO OF THE APPARENT RATE OF CORROSION OF THE NAKED PORTION OF SCALE-BEARING TO THAT OF SCALELESS DISCS. PARKER.[e]

	In cold water.		In London air.	In marine boilers.			
	Sea.	Bilge.		With zinc.	Without zinc. a	Without zinc. a	Mean.
Maximum.....	3·3	1·2	1·1	3·1	1 2	1·1	. ..
Minimum.	0 6	0·5	0 5	0·9	0·9	0 5	....
Average.	2 12	·87	·89	1 68	1·03	·77	1 23

a, a. In these two instances the scale was either wholly or nearly wholly removed during exposure.

Fig. 9 also illustrates the influence of scale. The corrosion curves for galvanic contact with copper and with scale bearing iron are convex towards the vertical axis, thus harmonizing with the observed progressive diminution of electromotive force, while the concavity of the other curves illustrates the accelerated corrosion under simple immersion or contact with bright plates.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

[a] Percy, Journ. Iron and St. Inst., 1877, II., p. 456: Bower, Idem, 1881, I., p. 166: Trans. Am. Inst. Mining Engrs., XI., p. 329, 1883: Kidder, paper before Chem. Soc. of Washington, 1885: Stahl und Eisen, IV., p. 98, 1884.

[b] Buffington, Annual Rept. Chf. Ordnance U. S. Army, 1884, p. 77: private communication, Nov. 15, 1887. Weightman, Trans. Am. Soc. Mechanical Engineers, 1884: Iron Age, June 11, 1885, p. 1.

[c] Minutes Proc. Inst. Civ. Eng., LXXXII., p. 300, 1885.

[d] Paper read before the Chemical Society of Washington, April 10, 1885.

[e] Journ. Iron and St. Inst., 1881, I., p. 49.

PERSONALS.

Mr. Geyer, of the Vienna mill, Wood River District, Idaho, has gone to Chili with Mr. Wartenweiler.

Mr. E. Gaugot, Mining Engineer of Belleville, Ont., is at present in this city and can be addressed at this office.

Mr. John F. Blandy, who has been in California for several months opening up mineral properties, has returned to Prescott, Arizona.

Mr. T. V. Powderly, General Master Workman of the Order of the Knights of Labor, is dangerously ill at his residence at Scranton, Pa.

Mr. C. C. Rueger, formerly mill manager at the Anaconda Works, has succeeded Mr. A. Wartenweiler as superintendent of the Lexington mine, Butte, Montana.

Lieut. Chas. T. Forse, of the Navy, has been detached from duty on the Coast Survey and ordered to Pittsburg, Pa., for duty as Inspector of Steel for the new cruisers.

Mr. Gardner P. Lloyd, President of the American Coal Company for the last twenty-four years, died suddenly, on the 13th inst., at his home, in East Orange, N. J.

Mr. Alfred Wartenweiler, who has been prominently connected with the mining interests of Montana for many years and superintendent of the Lexington mine, at Butte, has gone to Chili.

Reports state that Mr. Hal Sayr, of Denver, Colo., met with a painful accident in the Bonnybel mine, at Aspen, Colo., last week. While examining this mine he fell, in some way, about fifteen feet down an incline, and broke his collar bone.

Mr. Z. L. White, who is well known as one of the most intelligent writers of the secular press on mining matters and who was long a staff correspondent of the New York *Tribune*, has been engaged as the regular Washington correspondent of the Philadelphia *Press*.

Mr. Robert E. Masters has been appointed general superintendent of the Marshall Car-Wheel and Foundry Company's plant at Marshall, Texas, and in consequence has resigned his position as manager of the cast-iron department of the Tredegar Iron-Works, to take effect on the 31st of this month.

Mr. William Mulligan, a prominent iron manufacturer, died in this city on the 11th inst., aged sixty two years. For a number of years he was connected with the Ulster Iron-Works, formerly at Saugerties, N. Y. When the company moved its interests to this city about two years ago he came here to live.

Mr. Herman A. Keller, the Superintendent and Metallurgist of the Arkansas Valley Smelting Company, at Leadville, Colo., has resigned his position with that company, his resignation to take effect December 31st. Mr. Keller has accepted the position of metallurgist with the Holden Smelting Company, of Denver.

It is reported that Mr. H. M. Marks, the editor of the *Financial News*, of London, England, proposes to publish an illustrated Sunday paper in England. If the new venture is as successful as the *Financial News*, which is to-day unquestionably the most influential financial paper in London, it will mark an epoch in English journalism.

FURNACE, MILL, AND FACTORY.

The Leesport Furnace, at Leesport, Pa., went into blast on the 10th inst.

The Joliet Steel Company have announced that their rolling mills at Joliet, Ill., will be closed on December 23d indefinitely.

The iron foundry of W. S. Simmonds & Co., in Dartmouth, N. S., was destroyed by fire on the 15th inst. The lost is estimated at $60,000.

The entire plate department of the National Rolling-Mill, McKeesport, Pa., shut down on the 12th inst. for three weeks, to admit of building new foundations.

It is stated that the Etna furnace, at Etna, Ga., will be repaired and go into blast next spring for the manufacture of a "strictly cold blast" car-wheel pig-iron.

The Eastern Forge Company's works at East Deering, Maine, were burned on the 15th inst. The company were making car axles, and had orders ahead for all winter.

The Carbon Iron Company, at the Fort Pitt Works, Pittsburg, Pa., is contemplating a new 30-ton steel converting furnace, and the puddling furnaces are all to be remodeled so as to make iron direct from the ore by the Eames process.

Owing to a lack of orders the Clapp-Griffith department of the Spang Steel and Iron Company's works, at Etna, near Pittsburg, Pa., have been shut down. It is not expected that operations will be resumed before the beginning of the new year.

The Union Steel Company, Chicago, Ill., shut down their steel-works and rail-mill last week, having completed all the rail contracts on their books. The month of December will be devoted to general repairs, so that a good start can be made in January.

The United States Rolling Stock Company has decided to increase its capital stock from $3,000,000 to $4,000,000 and to build at Anniston, Ala., large car works, including a rolling mill and foundry capable of turning out twenty cars a day.

The powder mill of the Laflin Powder Company, at Laflin, near Pittston, Pa., exploded on the 13th inst., with a violence that shook the ground for many miles. The mills were situated in a narrow valley, and the different departments are widely separated, yet two were blown up, the corning and the polishing mills.

The American Electric Manufacturing Company of New York City has made arrangements with Electrical Development and Manufacturing Company, of Boston, Mass., by which the entire property, factory and patents belonging to this company will be absorbed by the American company for stock in the latter company.

The suits of R. L. Campbell, of Pensacola, and John P. McKewan, of New York, against the Woodstock Iron Company were decided at Montgomery, Ala., on the 15th inst. in favor of the company. These suits were brought to recover the property on which the town of Anniston, Alabama, is built, and involved $3,000,000.

The Bethlehem Iron Company, Bethlehem, Pa., has been experimenting in two of the company's ingot reheating furnaces with the Archer gas-fuel process, by which petroleum will be employed as fuel, and the results accomplished have been such as to lead the company to contract for two additional plants, which are now in course of erection.

The Manufacturers' Association of brass and iron steam, gas and water-works, held its annual meeting in Chicago, Ill., this week. One of the objects of the association is to maintain harmony between manufacturers, jobbers, plumbers and steam fitters. It was stated that the manufacturers' scale of prices for brass and copper work had been advanced only 25 per cent., while copper had advanced nearly 80 per cent.

At Roanoke, Virginia, in the case of Bartholomew *vs* the Rorer Iron Company, in which the sale of the entire property had been made to William Welch for $25,000, an upset bid was filed in the Hustings Court, on the 12th inst., by Clarence H. Clark, of Philadelphia, of $35,000, whereupon the sale to Welch was not confirmed. We announced the sale of this company's property in our issue of the 3d inst.

About 12 years ago the Mount Hope Iron-Works Company, of Somerset, Mass., sold part of its plant to the Old Colony Iron-Works, of East Taunton, for $117,000. Recently the Mount Hope Company bought back this property for $35,000. The works have been repaired and it is now said that the company intend to move its nail-works into the building recently purchased and equip the old building for a lead-works to produce sheet lead, lead pipe, etc. The concern will probably be ready to commence operations in March or April.

The Savage Fire-Brick Company, at Hyndman, Pa., is erecting three more large kilns, making in all eight, with a capacity of holding 320,000 fire-brick. The company has also put down a patent dry floor with a composition of furnace cinder, lime and cement, which becomes as hard as adamant. The works are run to their full capacity, which at present is 16,000 daily, but after their new kilns are finished their manufactured articles will amount to 30,000 brick per day. They also manufacture the celebrated silica or Dinas brick. The company intends putting up separate works for the manufacture of these bricks.

The suit of Gustav Lundborg against the Albany & Renssalaer Iron and Steel Company, Troy, N. Y., which has been in the courts for several years, was decided on the 10th inst. in the United States Court, New York city, the jury rendering a verdict for $8,464.80 for the plaintiff. The history of the case is as follows: The iron and steel company ordered 800 tons of Swedish iron from Lundborg, the agent of a Swedish iron firm. The company refused to receive the iron when it arrived, alleging that the iron contained too great a proportion of phosphorus. The suit was brought to recover its value. It was first tried in 1883 and a verdit of $12,000 was obtained by the plaintiff. A new trial was ordered on appeal to the United States Supreme Court.

CONTRACTING NOTES.

Contracts Open will be found on page xix. New contracts this week: No. 672, Supplies for Water Works, Pumping Engines, Boring Artesian Wells; No. 673, Supply the City of Wabash, Ind., with Natural Gas; No. 674, Boring Artesian Well; No. 675, Bridge; No. 676, Wrought Iron Pipe, Brick, Cement, and other Army Supplies; No. 677, Iron Columns; No. 678, Bridge Construction; No. 679, Iron Fittings; No. 680, Limestone and Syenite; No. 681, Valves, Screens, Sluice Gates, etc.; No. 682, Chemicals.

Machinery for crushing and grinding rock phosphate, etc., is wanted by A. J. Russell, Tallahassee, Fla.

The Montgomery Iron-Works, Montgomery, Ala., wishes to correspond with manufacturers of welded steel boilers for ice machines.

P. A. Carlton, Statesville, N. C., is in the market for iron roofing, and A. H. Jones & Co., Anniston, Ala., for roofing plate and roofing slate.

The four bids received by the Director of Public Works at Philadelphia, Pa., for meters, were, with one exception, to the effect that, owing to the increase in the price of the metals used in the manufacture of meters, the manufacturers could bid for only a portion of the meters that would be wanted during the year. The bids were for the same figures. It has been determined to readvertise for meters.

The contract for building the Harvard Bridge has been awarded by the Commissioners at Boston, Mass., to the Boston Bridge-Works at $183,050. The lowest bidder was the King Iron Bridge Company, of Cleveland, Ohio, at $173,700, but in consideration of the distance of the works of this company from the city of Boston, and the necessary expense of keeping an inspector at Cleveland, Ohio, for the inspection of the work as it progressed; and in view of the many advantages that would result to the cities of Boston and Cambridge, and the manufacturing and industrial interests and other reasons, it was decided to accept the bid of the Boston Bridge-Works.

The Water Bureau in Philadelphia, Pa., awarded contracts for iron pipes as follows: To the Camden Iron-Works, 500 lengths of 4-inch pipe, at 1·33 cents per pound; 10,000 lengths of 6-inch pipe, at 1·316 cents; 100 lengths of 8-inch pipe, at 1·312 cents; 100 lengths of 10-inch pipe, at 1·272 cents; 600 lengths of 12-inch pipe, at 1·261 cents; 250 lengths of 48-inch pipe, at 1·15 cents. To the McNeal Pipe and Foundry Company, 50 lengths of 16-inch pipe, at 1·239 cents per pound; 100 lengths of 20-inch pipe, at 1·228 cents; 100 lengths of 30-inch pipe, at 1·195 cents. To the Gloucester Iron Company, 600,000 pounds of small and large specials, at 2⅝ and 2·35 cents per pound. To the Camden Iron-Works, 500 pounds of breeches pipe, at 3·73 cents.

LABOR AND WAGES.

The Illinois Miners' Protective Association will hold its annual meeting, in Springfield, Ill., January 24th, 1888. Aside from the election of officers, the question of a scale of prices will be considered.

The Pennsylvania Railroad Company has authorized the extension of the privileges of the saving fund it has inaugurated for its employés to all parts of its system. The plan will be put into effect on January 1st.

The Glendon Iron Company and the Andover Iron Company, at Hibernia, Pa., will reduce wages from $1.50 to $1.25, beginning January 1st. All the other miners getting more pay will be reduced proportionately. It is reported that the same reduction will be made at Mt. Hope, Teabo, and Richards mines, also at Hurdtown.

At a meeting of Knights of Labor and members of the Miners' and Laborers' Amalgamated Association at Mount Carmel, Pa., on the 14th inst., it was decided to demand a continuance of the present Philadelphia & Reading Coal and Iron Company's rate of wages for next year. It is said similar action will be taken throughout the entire region.

The meeting of river coal operators, which was to have been held in Pittsburg, Pa., on the 10th inst., to consider the demands of their miners for an advance in wages, did not take place, only a limited number of operators putting in an appearance. Those present intimated that the advance would be granted as soon as there was a rise in the rivers sufficient to ship the present large stock of coal to the Southern markets.

GENERAL MINING NEWS.

The last rail was laid on the 14th inst., on the Minneapolis, Sault Ste. Marie and Atlantic Railway, thus forming a continuous line from Minneapolis to Sault Ste. Marie. The Canadian Pacific reached Sault Ste. Marie last week, and the only break in an uninterrupted line from Minneapolis to the Atlantic seaboard is the International Bridge, now being built across St. Mary's River, and which will, it is stated, be completed by the first of January.

ARIZONA.

GILA COUNTY.

OLD GLOBE.—Col. George E. White, resident agent at this mine, at Globe, has received orders from the East to place every thing in readiness to resume operations. The five or six weeks which must elapse before coke is received at the smelter will be ample time, it is said, to put the mine in shape to begin stoping ore, and it is expected that the furnaces will start up in January.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—An additional furnace has been blown in at the company's works at Clifton. Every effort is being made, says the Clifton *Clarion*, to take full advantage of the present market. The superintendent is now having pressed into bricks a large quantity of furnace dust, carrying about 15 per cent. of copper, which will be run through the furnaces as fast as they become sufficiently hard. Two men are capable of turning out about 7000 bricks weekly, or between 30 and 32 tons.

CALIFORNIA.

AMADOR COUNTY.

BUNKER HILL MINING COMPANY.—The company has already made arrangements to rebuild the hoisting works, recently destroyed by fire, as mentioned in our last issue.

MIDDLE BAR MINING COMPANY.—There is nothing doing at this mine; the looked-for machinery has not arrived, says the Amador *Ledger*.

CANADA.

PROVINCE OF ONTARIO.

KINGSTON & PEMBROKE MINING COMPANY.—A meeting of the directors was held in New York on the 15th inst. A report of the operations for the first six months was presented. It was shown that 22,000 tons of ore had been mined at a net profit of $14,000. The result was considered satisfactory, although not so favorable as had been expected. One mine showed sulphur, and its output was not of great value. A large sum of money was spent in development work, and in another mine a new vein has been struck which is sixteen feet thick. The company owns the mineral lands along the line of the Kingston and Pembroke Railroad.

COLORADO.

LAKE COUNTY.

We condense the following from the Leadville *Herald-Democrat:*

The Denver & Rio Grande will build a switch from its Red Cliff branch into St. Kevin Gulch next summer, for the benefit of the President and other large shipping mines in the St. Kevin District.

AMERICAN MINING AND SMELTING COMPANY.—The Rose Emmet shaft, which this company has been sinking on the south side Carbonate Hill, has struck the contact at a depth of about 450 feet. A contract has been let to sink the shaft 20 feet deeper for a sump, after which a drift will be started in the direction of the Robinson shaft, which the same company is sinking a short distance further northeast. The Rose Emmet shaft passed into a second body of porphyry after leaving the black shale. This shaft, as well as the Robinson, is sunk to strike the extension of the Iron mine ore chute, as shown in the Houghton mines, below the fault, if it extends as far in this direction.

EVENING STAR CONSOLIDATED MINING COMPANY.—Major Bohn, who has been sinking the No. 5 shaft of the Evening Star to reach the second contact, having a lease on that portion of the Evening Star territory, has stopped work in the bottom of the shaft and is now drifting westward to cut the contact in its dip. The bottom of the shaft is in the parting quartzite and he should not have far to go. This shaft is located near the carbonate fault. It is reported that a drill hole which the company sunk in this shaft several years ago passed through a thick body of low-grade ore.

MORNING STAR CONSOLIDATED MINING COMPANY.—This mine, although now worked entirely under lease, continues to be one of the largest producers in Leadville. The total iron shipments from the upper contact amount, on the average, to about 600 tons per month. From the lower contact from the Maid of Erin shaft about 1000 tons of silver ore a month are produced. Parties who have sub-leases are hoisting about 600 tons per month through the McHarg shaft.

LAS ANIMAS COUNTY.

It is officially stated that the Denver & Fort Worth Railroad will be shipping coal from Trindad in less than thirty days at the rate of 500 cars daily. It is supposed that on account of the Kansas coal famine work at this railroad has been hastened in order to get the tracks laid so as to be able to ship coal into Kansas over the Missouri Pacific Railroad as soon as possible.

PITKIN COUNTY.

GRAND RIVER COAL AND COKE COMPANY.—It is stated on the authority of Mr. W. B. Devereux, the general manager of this company, that the Colorado Midland Railway will deliver coal in Leadville for $5.50 per ton.

SUMMIT COUNTY.

VICTORIA MINING COMPANY.—The suits beetween John Westerman and this company, relating to several lode claims on Farncomb Hill, have been settled, and Mr. Westerman gives undisputed possession to all the property in which he claimed an interest. This releases one of the finest gold properties in the State from the entanglements of law.

DAKOTA.

LAWRENCE COUNTY.

IRON HILLS MINING COMPANY.—The dividend for December has been passed. The reason for this is that the output for last month was lighter than usual, occasioned in the first place by the shutting down of the smelter for about ten days, for the purpose of raising the stack and otherwise improving it, and in the second place by a bad cave on the 160 level that brought down an immense body of porphyry, that has hindered and retarded continuously, and has also covered up and shut out a large body of ore that can not be reached until the cave is removed and a further cave prevented. This will be accomplished as soon as possible, and that part of the mine opened up to the ore stopes. The president stated that there is nothing of a discouraging nature in the mine. Explorations have been made on the different levels, in different places, in many of which good ore was found in considerable quantities. On the 15th inst. the secretary and treasurer will publish a statement in detail of the output of the mine and smelter, and the total expenditures for the six months ending on that date. This will consist of the half year the new smelter will have been in operation.

GEORGIA.

CHEROKEE COUNTY.

Two gold mines in this county, one owned by the Alta California Mining Company, and the other by the American Mining Company, organized and chartered by the legislature in 1856, are being reopened and the company reorganized.

FANNIN COUNTY.

FIGHTING TOM MINING COMPANY.—The copper mine owned by this company, near the Ducktown mine, and which was successfully worked until the war stopped it, is being reopened, and the company reorganized. Mr. E. P. Wade, Jasper, Ga., can give further particulars.

FLOYD COUNTY.

Messrs. H. W. Dean & Co. have opened some mines of brown hematite iron ore, and also one mine of manganese, at Cave Spring, and are daily shipping from 100 to 150 tons of brown hematite ore.

GERMANY.

Gold mining has been resumed in the Saxe-Meiningen village of Richmannsdorf, which, several centuries ago, as the name (Rich Man's Village) indicates, was noted for its deposits of the precious metal.

IDAHO.

ALTURAS COUNTY.

BLACK SPAR.—This mine, at Muldoon, has been sold to a St. Louis company. A mill will probably be erected next summer. The ore is high-grade milling ore, showing stephanite and ruby silver. There is no lead in it.

LEMHI COUNTY.

VIOLA MINING COMPANY, LIMITED.—The smelter was to start up this month, after a shut down of six weeks. It is reported that there is a large stock of coke, charcoal and fluxes at the works, and that all the machinery has been put in order. It is said that the recent strike in the Viola mine has urged the company to increase the output and run the smelters to their utmost capacity.

INDIAN TERRITORY.

NATIONAL OIL TRUST COMPANY.—An association of St. Louis capitalists have organized the above company to develop the petroleum interests of the Indian Territory, and one of their prospect wells has already been driven to a depth of over 300 feet. The company has secured the exclusive franchise to develop and operate oil wells over an area of 20,000 square miles of territory. This right was obtained from the Council of the Nation, the consideration being a royalty of 10 per cent on the output at the place of production.

MARYLAND.

According to a report, Dr. Kempster, Superintendent of the Wisconsin Asylum for the Insane, discovered a rich gold mine a few miles from Washington, D. C., some months ago, and that he and other Wisconsin men, including Senator Sawyer, had bought a large tract of land including the discovery. Professor McGee, of the Geological Survey, who has made a special study of the geological formation along the Upper Potomac, stated, in reference to this report, that veins of gold-bearing quartz exist in the vicinity of Dr. Kempster's alleged discovery, but that it does not exist in sufficient quantity to make mining profitable. Ever since this part of the country has been settled there have been at intervals of five years or so reports of wonderful gold discoveries, but mining operations have never been carried on because the ore was not rich enough to make it pay. Professor McGee states further, that as far as his observation and knowledge went, there was only a color of gold in a ton of quartz. As far as gold-bearing gravel was concerned, he did not know of any such gravel in this vicinity, and it is his opinion that Dr. Kempster had possibly been imposed upon.

CAROLINE COUNTY.

CHOPTANK IRON ORE MINING COMPANY.—This company, of Philadelphia, has obtained control of a large body of ore in Caroline County, which is said to analyze about 50 per cent of metallic iron, and all of which is low in phosphorus and sulphur. The deposit is within easy reach of present railroad facilities, and it is the intention to place the ore on the market at once. The deposit is a out one hundred miles from Philadelphia.

MEXICO.

A number of gold deposits have been denounced on the hacienda of San Diego, Curucupaseo, and it is said that these denouncements have been made by an American company whose manager has left for the United States on business pertaining to this enterprise.

MEXICAN COPPER COMPANY, LIMITED.—This company has been formed, with a capital of £250,000, for the purpose of acquiring the Ingurron copper mines in the State of Michoachan. The property covers 400,000 square yards, and contains a large belt of copper-bearing strata, 500 feet in width. No shares will be offered to the public, the capital having been privately subscribed.

TRANSCONTINENTAL DEVELOPMENT COMPANY.—This company, which has just been organized with a capital stock of $100,000, has for its purpose to obtain various concessions from the government of Mexico for mining purposes, railroad building and lands for exploration, colonization, etc. Jesse R. Grant, son of late General Grant, is one of the incorporators and a director.

MICHIGAN.

The contract for building ore docks at Marquette and St. Ignace has been let to Thomas H. Hamilton, of Toledo. Three docks at Marquette have a capacity of 18,000 tons, and will be increased to 33,000 tons. The additional docks at St. Ignace will hold 10,000 tons. The new docks will be built by the opening of navigation next spring.

COPPER MINES.

ALLOUEZ MINING COMPANY.—The company has resumed work by putting fifteen miners at work sinking No. 2 shaft. If copper stays up in price it is believed that the company will work the mine to its full capacity as soon as the necessary repairs can be completed in its working plant.

MIKADO MINING COMPANY.—The prospects of the mine are good. The shaft has been sunk recently twenty-three feet in clean shipping ore. Assays made by Professor Edwards, of the Michigan Mining School, show metallic iron, 64·23; silica, 2·[illegible] phosphorus, 0·052.

PILGRIM MINING COMPANY.—Recent reports by the superintendent show that there is considerable trouble with water; work is progressing. The shaft has now attained a depth of two hundred and two feet. In the bottom of the shaft they have found the best ore yet discovered in the mine.

MISSOURI.

BATES COUNTY.

Preparations are making to drill for natural gas near Rich Hill.

MONTANA.

The Montana Central Railroad to Sand Conlee will be completed some time in January, when coal will be shipped from there to Helena. It is stated that the coal is good for domestic purposes and for smelting-works.

LEWIS & CLARKE COUNTY.

MONTANA COMPANY, LIMITED.—From the superintendent's, Mr. Henry Bratnober, report for the month of October, just published by the company, we take the following: The appearance of the mine is not as satisfactory as it has been in the past. The amount of ore, however, which has been discovered is very satisfactory when regarded in the light of tons, and, although we have not been able to place any ore to reserve which will assay more than $30 to $35 a ton, *we have increased the reserves by a large number of tons of good low-grade*, which should yield in the future a very handsome profit. Like most other mines, it would seem that the Drumlummon is going to have periods of richer and poorer development, and it appears that we are now passing through a period of the latter description. To me, however, that is not a matter of discouragement, and I think that a little patience on your part, coupled with persistent development on this side, will carry you speedily through this period, and place, before long, at your disposal other discoveries of very high-grade ore, which will equal, if they do not exceed, any discoveries which we have had in the past.

The following are extracts from Mr. R. T. Bayliss's report, dated November 8th: "The developments in the mine are set forth in detail in Mr. Bratnober's report of yesterday's date, and it is therefore only necessary for me to repeat that the developments of the past three months are correctly described in his report as having yielded, to all intents and purposes, nothing but good low-grade ore, for, although some of it being over $30 per ton will come within the category of high-grade reserves in our half-yearly statement, they can not be considered as the high grade which has heretofore been *required for maintaining the average of the monthly runs.* I have, however, great hopes that continued development in depth below the 700-foot level will again yield some of the very high-grade rock which has been a marked feature in the development of the past three years, as the 700-foot level north is showing a very great improvement over the developments in the 600-foot level north, and fully justifies the hope, which I expressed at the shareholders' meeting, that we should find the 700-foot level as much superior to 600 as the 600 was to the 500-foot level. I am looking with the very greatest interest to continued work in the 600-foot level south, which I expect within the next three or four months to yield some very large and very valuable bodies of ore. In order to expedite this work, I have put on a double shift in this level, and, although the ground is very hard and tight, I hope to be able to advance at the rate of about 100 feet per month. This should bring us in two or three months into the Jubilee chute, and you will do well to keep your attention fixed upon that ore-body, and look to the development in that direction to yield some very profitable results."

[The directors advise the stockholders not to sacrifice their shares. As might be expected a large part of the public look upon the unfavorable reports only now made public—though the manager says that for three months past all the ground open has been poor—as an ordinary stock jobbing device to get the shares down for another boom. The mine has been a wonderful one, and though we have no independent advices concerning it, it may be well to remind stockholders that even the best mine finally gives out.—EDITOR ENGINEER AND MINING JOURNAL.]

SILVER BOW COUNTY.

LEXINGTON MINING COMPANY.—Official advices state that the production for November amounted to $62,231 in silver, $6,871 in gold, making a total of $69,102.

NEBRASKA.

DOUGLAS COUNTY.

Natural gas was struck at Omaha in digging a well at a depth of 450 feet. The flow is rather weak, but it burns steady.

NEVADA.

ELKO COUNTY.

COMMONWEALTH MINING COMPANY.—The shaft has been sunk to a depth of 137 feet. It is cutting very rich ore in one corner.

GRAND PRIZE MINING COMPANY.—The north drift on the 300 foot level shows ore, average samples of which assay $325 per ton. This drift has been timbered 40 feet in from the turn-table, and one stope carried along the top of the drift to admit of the same, ore being from 1 to 2½ feet in width: average assay $245 per ton.

NEVADA QUEEN MINING COMPANY.—Cross-cut on 350-foot level has been advanced a total of 184 feet. Face is in vein matter giving low assays, also a very large flow of water. Battery pulp average assay for the week ended the 9th inst., $178. Mill is running all right.

NORTH BELLE ISLE MINING COMPANY.—The south drift No. 3, 70-foot level, is developing a good grade of ore. Average grade of ore milled the week ended the 9th inst., $284.75 per ton. All work in and about the mine and mill is progressing satsfactorily.

ESMERALDA COUNTY.

MOUNT DIABLO MILLING AND MINING COMPANY.—The bullion production for November amounted to $48,738 84.

EUREKA COUNTY.

STAR MINING AND SMELTING COMPANY.—Liens have been filed against this company, of Union, for sums aggregating $13,043.27.

HUMBOLDT COUNTY.

PARADISE VALLEY MINING COMPANY.—It is reported that another large ore deposit has been discovered in No. 5 tunnel in this mine, which is the lowest level of the mine. The ore is said to carry considerable ruby silver.

LANDER COUNTY.

MANHATTAN SILVER MINING COMPANY.—The property of this company at Austin is to be sold by the Sheriff of Lauder County on December 22d to satisfy the claims which, together with costs, etc., aggregate the sum of $82,837 15.

STOREY COUNTY—COMSTOCK LODE.

We condense the following from the Virginia City *Chronicle*:

The pay rolls of the different Comstock mining companies amounted to $233,325. This shows an increase of $1000 in the total sum disbursed above the October pay rolls.

The Montezuma Consolidated and the West Consolidated Virginia & California have been added to the list of mines in operation on the lode. Surface work is also in progress at the New York, Silver Hill and Kossuth, preparatory to resuming the development of those properties, in all of which bodies of low-grade ore were developed on the upper levels that were never thoroughly explored. The three last-named are controlled by Senator Jones, who has also succeeded to the principal interest in the Justice.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—The total production for November will exceed $300,000. During the week ended December 3d, 1004 tons of ore were shipped to the Morgan mill, 1837 tons to the Eureka mill and 1600 tons to the California mill. The average assay value of all the ore worked at the above mills during the week, according to battery samples, was $32.13. The ore development below the 1435 level promises to prove one of the most important yet made in the mine. When ore was first cut in upraising above 1435 level west cross-cut No. 2, it showed a breadth of but four feet and passed out to the west, in which direction the ore dips. The development has now widened out to a breadth of 26 feet of ore as high in average grade as any heretofore found in the mine.

HALE & NORCROSS MINING COMPANY.—The ore development in the upraise above the 700 level is said to show a breadth of six sets of timbers in the east cross-cut, with the same still showing in the face. (Six timber sets equals a width of 30 feet.) This development is in entirely new ground, east of the old stopes, and bids fair to prove the most important ore-body yet discovered in the mine. Car sample assays range in value from $40 to $50 per ton. Shipments of ore are now being made to the Vivian mill from the new development.

MONTEZUMA CONSOLIDATED MINING COMPANY.—A new tunnel has been started which will cut ledge 50 feet below bottom of old shaft, from which the ore formerly produced was raised. This tunnel will run through favorable working rock and will strike the ledge on west dip in about 100 feet and thence be continued in the lode to the old shaft.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—In No. 2 upraise, 100 feet on the slope below the upper tunnel, there were extracted 25 tons of milling ore. There has been shipped to the Briggs mill 627¾ tons of ore. Bullion valued at $3,686.65 is on hand in the assay office and will be shipped to San Francisco. On the 48 level there were extracted 23 tons of fair-grade ore.

OPHIR MINING COMPANY.—At a point 35 feet above the 1465 level, in a winze down from the 1300 level, there were extracted 22 tons of fair grade milling ore.

POTOSI MINING COMPANY.—A large quantity of ore, extracted in explorations on the 250 and 350 levels, is now being crushed in the mill, which is handling about 70 tons daily.

SAVAGE MINING COMPANY.—During the week ended December 3d 514 tons of ore were extracted, of which but 359 tons were shipped to the mill. The falling off in the output is not due to the supply of ore diminishing, but to a lack of crushing power at the Mexican mill, a majority of the stamps in which were hung up on account of the lack of motive power. The stopes on the 600, 700 and 750 levels are showing the usual grade of ore. Bullion valued at $60,000 is on deposit at the Carson Mint to offset an indebtedness amounting to $40,860 97.

NEW YORK.

The excitement in Central and Western New York over natural gas and petroleum is increasing. Companies are being formed in large numbers to sink wells, and capital is being invested by the hundreds of thousands, there are 33 test wells sunk hundreds of feet in localities within a radius of 70 miles of Waterloo. In several localities thousands of acres of land have been leased by newly-formed gas and oil companies, and wells are being sunk. At Morrisville a well was sunk to a depth of 2000 feet, and then abandoned. At North Rose, Wayne County, gas was struck at a depth of 680 feet. At Wolcott, in the same county, gas was struck at a depth of 2160 feet, three weeks ago, continued 300 feet deeper. The well was then piped and a smaller flame of gas lighted. It has since been burning constantly. Two more wells are to be sunk.

At Clyde a natural gas well has just reached a depth of 2200 feet; two small "pockets" of gas have been found. Another well is to be bored at Lock Berlin by the same company, and in the same neighborhood next spring. At Seneca Falls and at Trumansburg, in this immediate vicinity, the Seneca Gas and Oil Company have begun the sinking of test wells for gas or petroleum. At Ithaca a well has been sunk to a depth of 3700 feet, and nothing of value found there except springs of salt water, and work has now been abandoned. At Watkins the same rock formation as at Ithaca is found, and a test well has been sunk near the famous Watkins Glen to a depth of 1800 feet. Three "pockets" of gas have been pierced by the well.

A little further to the southeast the Central & Southern New York Gas and Oil Company, which is one of the largest in this State, is making a very extensive search for natural gas. At Hammondsport springs of gas have been found in the course of boring the wells. At Batavia a well has been bored the depth of 1500 feet, and natural gas has not been found in appreciable quantities. The gas well at the little village of Gasport, in that locality, is by far the most successful there. The flow of gas has been continuous for over four months, and has been put to practical use. In two months more another well is to be bored near at hand, and then plans will be made for conducting the gas from both wells to Lockport and Medina. Four wells for natural gas are to be sunk in Niagara and Genesee counties.

Other wells are now in process of boring at Le Roy, Bath, Moravia, Castile and Norwich. It is predicted by many of the best oil and natural gas experts from Pennsylvania and Ohio that New York will have about one half as many paying gas wells in two years as Ohio has now. The great difficulty so far has been in correctly tracing the course of what the experts call the black oil rock. It has been found at Wolcott and North Rose, and also at Gasport, where natural gas flows in good quantities. The Watertown natural gas well has also probably pierced the same rock.

Natural gas has just been struck at Penn Yan, Yates County, at a depth of 50 feet. Several wells are to be sunk in the vicinity.

OHIO.

LUCAS COUNTY.

TOLEDO OIL COMPANY.—This company, which had a refinery at Toledo for coal oil, has been purchased by the Standard Oil Company for $100,000.

OREGON.

BAKER COUNTY.

MARYSVILLE MINING AND CANAL COMPANY.—This company, for many years owners of the Auburn canal and water ditch, built in the year 1863, and since that time the main water supply for the placer mines of that heretofore rich camp, has sold the same for $35,000 to the syndicate of California capitalists who recently bought the Salmon Creek mines. This great water-way will hereafter be used to the working of the Salmon Creek mines.

MULTONOMAH COUNTY.

PORTLAND REDUCTION WORKS.—These works, at Portland, which were built by a company organized in August, 1886, have started up and a long and successful run is anticipated. Various causes have operated to prevent the works from commencing operations. The most serious obstacle has been the matter of transportation. Another drawback has been the difficulty in procuring the different kinds of ores necessary to successfully operate a smelter. The present plant is a small one, but in time the works will be enlarged as the situation demands. The company has a capital stock of $300,000. Prof. J. E. Clayton is the consulting engineer.

PENNSYLVANIA.

PENNSYLVANIA GRAPHITE COMPANY.—The company is moving its buildings to an adjoining property in Upper Uwchlan, where it has a vein of ore, and will put in new machinery preparatory to doing a heavy business after the first of the year.

COAL.

Some 30,000 acres of lands in the Kettle Creek region, Clinton County, have recently been examined and a number of coal beds have been opened which stand in the face of the gangway from three feet four inches to four feet two inches. When a short line of railroad is built, as contemplated, 1000 tons of coal can be put daily on the market. Coke of excellent quality, it is said, has been made from the coal.

WESTMORELAND COAL COMPANY.—The company has increased its capital stock $200,000, making its total capital $2,000,000. This increase was necessitated, it is stated, by the enlarged and growing business of the company.

NATURAL GAS

CHARTIERS VALLEY GAS COMPANY.—Samuel B. Ross entered suit on the 13th inst., at Pittsburg, against this company. M. Ross says he owns forty acres in the Twenty-first Ward, which he values at $75,000, but the action of the defendant in running a gas main through his property has depreciated it $15,000. He brings suit to recover the difference.

PHILADELPHIA NATURAL GAS COMPANY.—The company has decided to build a new 24-inch line clear through to Murraysville. This line will bring in the pressure of twenty more wells to the company's system in Pittsburg.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to December 10th:

	1887. Gallons.	1886. Gallons.
From Boston	3,837,486	5,390,283
Philadelphia	154,753,551	143,729,395
Baltimore	8,193,251	14,580,160
Perth Amboy	16,160,659	6,082,059
New York	356,369,683	374,519,286
Total exports	539,314,630	544,301,183

The Chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of November, 1887, and during the eleven months ended November 30th, 1887, as compared with similar exports during the corresponding periods of the preceding year, as follows: November, 1887, $3,713,074; November, 1886, $3,987,190; eleven months ended November 30th, 1887, $41,246,286; eleven months ended November 30th, 1886, $43,424,814.

After two and a half years of incessant labor, D. M. Hukill has succeeded in securing oil in Greene County. The main producing strata for the Green County region is what is known as the "Big Injun," or 300-foot strata. This differs somewhat from the Washington County strata. There are now three producing wells, two of which have been torpedoed with good effect, and there are three more wells under way. It is stated that this field has been worked unsuccessfully by several parties.

TEXAS.

Statistics in the office of the United States Collector of Customs give the importation of silver ore from Mexico to El Paso during November as 6762 tons, valued at $340,135. This is an average of 226 tons per day. The daily average for October is 176 tons, and the highest daily average for any month preceding October was 147 tons. The total importation for the past eleven months is 40,476 tons, against a total of 22,045 tons for 1886.

EL PASO & NORTHEASTERN RAILWAY AND TELEGRAPH COMPANY.—This company, which has a capital of $300,000, has secured a charter for a new railroad to run from El Paso, Tex., northward to the White Oaks coal regions. Ex-Senator William Windom, ex-Senator Stephen W. Dorsey, and others are interested in this company.

UTAH.

It is reported that the Salt Lake Chamber of Commerce will send a delegation to Washington to oppose the reduction of the tariff on lead and lead ores. The Secretary of the Omaha Board of Trade is the first to notice the Salt Lake Chamber of Commerce letter on the lead tariff. Secretary G. W. Mattinger writes that the letter will be submitted to the Board on the 12th; also, he says: "I have no doubt but that action thereon will be taken which will be in accord with and a support to the movement you have placed on foot."

JUAB COUNTY.

PARIAN MARBLE COMPANY.—This company has been organized with a capital stock of $1,250,000, shares $5 each, for the purpose of carrying on a general mining business. The company's quarries are located four and a half miles west of Nephi; the main office will be in Salt Lake City. The officers are: J. M. Dart, President; Lewis Martin, Vice-President; C. E. Allen, Secretary and Treasurer.

SALT LAKE COUNTY.

Parties have purchased 120 acres of land near Salt Lake City, and are about to organize a company to bore for natural gas. There is one well on the property which has a depth of 240 feet, and which supplies natural gas to some buildings for heating purposes. Three other wells are being drilled which have now a depth of about 115. If a permanent supply of gas can be obtained, it will be piped to Salt Lake City. The parties interested in the enterprise are A. J. White and A. O. White, of Salt Lake City; J. M. Knox, L. W. Billingsley, and W. H. Woodward, of Lincoln, Neb.

SOUTH GALENA CONSOLIDATED MINING COMPANY.—This company has just completed the sinking of the shaft to a depth of 240 feet. Cross-cutting has commenced at the bottom. On the level 100 feet above they had a large body of ore which ran first-class 50 per cent lead, 30 ounces silver and $50 in gold. One lot of 100 tons averaged $64 in gold, and it is thought this body of ore will be struck at the present depth. There is a large lot of second-class on the dump, and much of the dump being good concentrating ore, it is being worked over at the rate of thirty tons per day—day shift only—reducing to seven tons concentrates running about 50 per cent lead, 30 ounces silver and $12 in gold.

SUMMIT COUNTY.

DALY MINING COMPANY.—The production for November was 58,655.04 fine ounces of silver and $8951.92 in ore sales. The total production for the eleven months of the current year is about $878,983.26.

ONTARIO SILVER MINING COMPANY.—The production for November was 66,426 fine ounces of silver and $73,059.06 in ore sales. The total production for the eleven months of the current year is about $1,670,275.73.

WASHINGTON COUNTY.

The Stormont mill is running steadily on custom ore. Chloriders have gone to work since the mill was started by the lessees on the 1st inst., and the camp promises to be more lively than in the past few months.

WEST VIRGINIA.

M'DOWELL COUNTY.

ELKHORN COAL AND COKE COMPANY.—This company is building 100 bee-hive coke-ovens, expecting to have them finished by May 1st, 1888, by the time the N. & W. RR. gets to Coopers, on the headwaters of Elkhorn River. The tipples, openings, etc., are all ready.

WYOMING.

The Cheyenne & Burlington Railroad a branch of the Burlington & Missouri Railroad system, was completed to its depot in Cheyenne on the 1st inst. The formal opening of the road will take place on the 13th inst. It is expected that the Cheyenne & Burlington Railroad will push north from Cheyenne during the coming year, and will finally be extended entirely across Wyoming, by way of the Platte and Sweetwater valleys, to form a connection with the Central Pacific Railroad.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 16.

Statistics.

Production Anthracite Coal for week ended December 10th, and year from January 1st:

TONS OF 2240 LBS.	1887. Week.	1887. Year.	1886. Year.
P. & Read. RR. Co..	163,855	7,174,482	11,059,413
Cent. R. R. of N. J.	93.605	4,574,658	*
L. V. RR. Co.....	.....	5,534.901	5,888,057
D., L. & W. RR. Co.	165,625	5,760,192	4 815,240
D. & H. Canal Co..	98,620	3,798,882	3,397,928
Penna. RR.....	52,551	3,406,665	3,177,019
Penna. Coal Co.....	35,304	1,512.700	1,421,298
Penna. Canal Co...	1,897	480,251	470,956
N. Y., L. E. & W. RR.....	‡66.552	†695,487	661,250
Total.....	678,009	32.935,218	30,891,656
Increase.....	35,639	2,043,562	.....
Decrease.....	.....	.....	.....

* Included in tonnage of Philadelphia & Reading RR.
† Tonnage to December 1st.
‡ Tonnage for month of November.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1882.....	28,251,876	1884.....	30,123,97
1883.....	30,566,188	1885.....	29,744,198

Production Bituminous Coal for week ended December 10th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

EASTERN AND NORTHERN SHIPMENTS.

	1887. Week.	1887. Year.	1886. Year.
Phila. & Erie RR.....	352	20,859	16,756
*Cumberland, Md....	83,807	3,116,791	2,391,†86
*Barclay, Pa.....	.....	165,950	169,126
Broad Top, Pa.			
H. & Broad Top.. RR.		321,911	302,244
Clearfield Region, Pa.			
Snow Shoe	3,034	153,133	103,761
Karthaus (Keating).	4,699	183.400	139,244
Tyrone & Clearfield..	85,757	2,026,314	2,099,479
Tipton.....	398	15,102	.....
Alleghany Region, Pa.			
Gallitzin & Mountain.	16,979	881,513	637,066
Pocahontas Flat Top Coal.			
Norf'k & West. RR...	32,459	1,088,626	813,711
Kanawha Region, W. Va.			
Ches. & Ohio RR....	. ....	1,437,726	1,115,750
Total....	227,425	10,441,325	7,868,822

* Tons of 2240 lbs. † Week ending November 21st.

WESTERN SHIPMENTS.

Pittsburg Region, Pa.			
West Penn RR.....	8,618	290,724	301,182
Southwest Penn. RR..	2,976	111.738	145,237
Pennsylvania RR....	3,487	194,598	263,560
Westmoreland Region, Pa.			
Pennsylvania RR.....	42,730	1,515,546	1,210,256
Monongahela Region, Pa.			
Pennsylvania RR.....	8.294	405,068	380,264
Total.....	66,105	2,517,674	2,300,499
rand total.....	293,530	12,928.999	10.169,322

Production of Coke on line of Pennsylvania RR. for week ended December 10th, and year from January 1st.

Tons of 2000 pounds.	1887. Week	1887. Year.	1886. Year.
Tyrone & Clearfield ..	12	1,762	.....
Allegnany Region ...	5.751	240,098	185,993
West Penn. RR.....	2,263	104.016	102,646
Southwest Penn.RR .	66,959	2,709,009	2,576,105
Penn. & W. Region..	11,181	354,311	313,792
Monongahela..	3,733	115,307	139,614
Pittsburg Region....	.....	30	108
Snow-Shoe..... ...	2,117	54,054	26,577
Total.....	92,016	3,578,587	3,344,835

Anthracite.

This market is much easier, and prices are settling down to the standard prices which we have been quoting, only that what was *net* a few weeks ago is now subject to the usual 15 cents commission.

For free burning coals we quote *net* prices, f.o.b.: Broken, $3.85@$4; Egg, $4.10@$4.25; Stove and Chestnut, $4.75. Lehigh coal sells at $4.50 for Broken and Egg; $5 for Stove and Chestnut; $2.85@$2.90 Buckwheat.

There is nothing exciting in the market except the demands of the Knights of Labor on the Reading Company that the present rate of wages, 8 per cent above the basis, be continued through the next year. President Corbin has not yet conceded this, but there is little doubt expressed in the trade that he would do so quickly were it not that the Lehigh operators and the Lehigh Valley road have shown a determined opposition to such a concession. They are in fact getting tired paying the piper for the Reading to dance, and it is intimated that there is music in the air should President Corbin give in, as usual, to the demands of the Knights. The Lehigh operators have no intention of making the advance, and the Reading must come to some arrangement before 2d January or there will be a strike in the Schuylkill.

The production statistics show an increase in output for the eleven months of the year of 2,242,926 tons, and for November the output was 108,553 tons greater than the corresponding month last year.

The stock of coal at tide water is very low, only 112,103 tons, against about 750,000 tons, which was an average a year ago.

Mr. John H. Jones, official accountant, has sent us the following statement of the anthracite coal tonnage for the month of November, 1887, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

COMPANIES.	November 1887.	November. 1886.	Difference.
Phila. & Reading RR...	788,608	748,734	Inc. 39,874
Central RR. of N. J....	427,473	498,142	Dec. 70.669
Lehigh Valley RR.....	397,526	627,333	Dec.229.807
Del., Lack. & West. RR.	717.542	529,109	Inc. 188,433
Del. & Hud. Canal Co..	444.587	349,844	Inc. 94,742
Pennsylvania RR.....	366.528	312,204	Inc 54,324
Pennsylvania Coal Co.	177,375	146,528	Inc. 20.846
N. Y., L. E. & W. RR...	66,552	65,742	Inc. 809
Total	3,386,191	3,277,636	Inc. 108,555

COMPANIES.	For year. 1887.	For year. 1886.	Difference.
Phila. & Reading RR...	6,936 947	6,151,056	Inc. 785,890
Central RR. of N. J....	4,470,413	4,536,397	Dec. 65,984
Lehigh Valley RR.....	5,427,804	5,587.537	Dec.159,733
Del., Lack. & West.RR.	5,495,107	4,694,389	Inc. 800,718
Del. & Hud. Canal Co.	3,630.5 9	3,216,854	Inc. 413,675
Pennsylvania RR	3,464,930	3,190,325	Inc. 274,605
Pennsylvania Coal Co..	1,451,722	1,287,204	Inc. 164,518
N. Y., L. E. & W. RR..	695.487	661,250	Dec. 34,237
Total.....	31,572,939	29,325,012	I. 2,247,927

The stock of coal on hand at tide-water shipping points, November 30th, 1887, was 112,103 tons; on October 31st, 1887, 158,976 tons; decrease, 46,873 tons.

Bituminous.

There is absolutely nothing worthy of note in this market. The companies stick well to the standard rate of $3.50 for standard coals, and the outsiders are coming into the fold. Every thing looks favorable for a good business next year, and it is probable that the price will be somewhat advanced then.

Boston.

[From our Special Correspondent.]

The mild weather is having a marked effect, and dealers may be saying very soon that they are having too much of a good thing. They were glad of it at first, as it relieved the pressure of orders that could not be filled, and no one is complaining yet. Still the market is easier for all kinds of anthracite coal than it was, and the careful buyer will find it so if he takes pains enough to sound the wholesale market in good shape. There is no urgent demand for spot coal now, and where $5.75 and thereabouts would have been paid for stove coal afloat or on spot a short time since, now not over $5@$5.25 would be obtained, because there is no suffering in the trade. A cold snap would brace up the market, but we have had regular October weather for several days.

There is now about two weeks' detention on stove coal, which is held at $4.75 f.o.b. at New York. Broken coal is fairly abundant for immediate shipment at $4 f.o.b. For egg coal there is still about a week's detention, on a basis of $4.25 f.o.b. A large amount of coal remains to be delivered on orders accepted without time limit as to delivery on basis of $4.25@$4.50 f.o.b. for Stove, so that there is very little new business stirring.

In the line of bituminous coal, the amount of new business continues small, and on a basis of $2.60@$2.70 f.o.b., but with slow delivery. I hear of $2.85 being asked, but no sales are reported at that figure. It is suggested that this is the 25 cents added to the pool price of $2.60 which must be paid as a forfeit to the pool by all who exceed their quota.

There is a firm tone to freights.

We quote, exclusive of discharging: New York, $1.25@$1.40; Philadelphia, $1.50@$1.60; Baltimore, $1.60; Hampton Roads, $1.50@$1.60.

Retail movement is good at unchanged figures, but there is no rush.

Buffalo.

Dec. 15.

[From our Special Correspondent.]

With the exception of a few hours' frost night before last, warm weather has prevailed for several days; not warm enough to do without small fires, but bright and cheerful, sunny and spring like. Yesterday evening the first propeller arrived. There are no vessels on the lakes now, and all the craft here are being stripped previous to going into winter quarters.

There are no new features in the coal trade relative to supply, demand or freight charges, as far as can be learned from dealers and wholesale agents. The market is easy, however, and no premiums need be paid to insure early delivery. Old orders are now being filled, and as a consequence small dealers here and at near by points have become calm and grumble not. This has been an exciting year.

It is reported that the Belle Lewis & Yates Company will cease to be agents for the Rochester & Pittsburg Coal and Mining Company's coal next year, as that company intend selling their own coal in future, and will not use the Buffalo & Rochester Railroad for bringing in coal from their own mines after May 1st next.

Another route hence to the Reynoldsville fields is projected via the Lake Shore or Nickel Plate to Dunkirk, thence to Warren via the Dunkirk, Allegheny Valley & Pittsburg, thence by the Philadelphia & Erie Division of the Pennsylvania to Sheffield, and from that place by a new line 40 miles in length.

The rumor has been revived that the Rome, Watertown & Ogdensburg will ally itself with the New York, Lake Erie & Western as far as using the latter's road to Buffalo. And further, that this arrangement will go into effect early in the coming year.

The receipts of coal by canal at Buffalo during the year 1887 were 59,539 net tons, as compared with 81,445 tons in 1886 and 180,348 tons in 1885; the shipments, 8706 tons, as compared with 19,676 tons in 1886 and 27,032 tons in 1885.

The range of freights by lake during the season of navigation from Buffalo were as follows: To Chicago, 60 to 135c.; to Milwaukee, 60 to 135c.; to Duluth, 50 to 90c.; to Green Bay, 90 to 135c.; to Sandusky, 25 to 50c.; to Sheboygan, 100 to 145c.; to Toledo, 25 to 75c.; to Detroit, 25 to 50c.; to Racine, 75 to 145c.; to Saginaw, 35 to 75c.; and to Washburn, 50 to 90c.

The distribution of coal from this port, aggregating 1,904,060 net tons, was as follows:

Place.	Tons.	Place.	Tons.
Chicago	740,560	Sheboygan.	12.990
Milwaukee.....	393,760	Saginaw.....	20.970
Duluth.....	167,340	Marquette.....	16 570
Superior...	93,140	Pt. Arthur.....	6,180
Washburn.....	23,510	Lake Linden	7,200
Toledo	83,940	Au Sable.....	300
Detroit	43,170	St. Joseph.....	440
Racine	19.300	Maitland.....	100
Evanston	1,920	Cheboygan.....	600
E. Tawas.....	700	Huron.....	250
Barega	500	Kingston.....	800
Pt. Burwell.....	140	Kelly Island.....	980
Sault Ste. Marie..	700	Hancock.....	3,500
Dunville.....	100	Ashland.....	8,950
Mackinac.....	580	Menominee.....	3,360
Muskegon	660	Marine City.....	1,410
Put in Bay	250	Spanish River.....	150
Alpena	400	Pt. Huron.....	5,110
St. Ignace.....	630	Manistee	500
Several small ports.	278	Cleveland	6,450
Pt. Rowan.....	30	Owen Sound	400
Pt. Stanly	30	Depere	450
Pt. Dover.....	400	Houghton.....	1,850
Amherstburg.....	300	Livingston.....	660
Portage..... ..	700	Escanaba.....	1,360
Bay City.....	5,577	St. Clair.....	1,250
Kenosha.....	6,340	Windsor.....	2,500
Kinoardine.....	3,820	Oscoda.....	550
Green Bay.....	27,050	Miscellaneous ports not accounted for during season by way of vessels from Towawanda..	170,449
Manitowoc	6,570		
Pequaming.....	410		
Algonac	580		
Sandusky.....	3,050		

Returns from railroads of receipts and shipments are not to hand yet. They will be obtained early next January, without doubt, and as soon as possible sent for the information of the readers of the ENGINEERING AND MINING JOURNAL.

Pittsburg

Dec. 15.

[From our Special Correspondent.]

COAL.—We have no change to note as relates to prices or demands. The expected rise failed to come to time, hence the shipments by the Ohio River, since June, do not exceed 250,000 bushels. Prices in Cincinnati and Louisville continue high. A slight rise in the Kanawha River has enabled the coal men to forward a limited number of barges coal to Cincinnati, which will probably reach that port the last of the week. The miners are asking an advance.

PRICE OF COAL PER 100 BUSHELS.

First pool.....	$4.75	Fourth pool.....	$3.25
Second pool.....	4.25	Railroad coal....$5 00@5.25	
Third pool.....	3.75		

CONNELLSVILLE COKE.—The demands exceed the supply, not on account of coke, but because there is not sufficient cars to meet the demand. A new coke railroad is talked of by the coke men. It seems that something must be done if they intend to keep the

business in that region. The scarcity of freight cars seems to be general on all the roads. Blast-furnace, f.o.b., $2 per ton; foundry, $2.30; crushed, $2.60.

FREIGHTS.

The latest actual charters to December 9th, per ton of 2240 pounds:

From Philadelphia to:—Alexandria, 1.05; Bath, Me, 1.85*; Boston, 1.75@1.85*; Chelsea, 1.75*; E. Boston, 1.75*; Galveston, 3.00; Gloucester, 1.75*; Lynn, 1.90@2.00*; Marblehead, 1.75*; New York, 90§; Norfolk, 75; Portsmouth, Va., 65; Portsmouth, N. H., 1.90*; Richmond, Va., 1.00; Washington, 1.15.

From Baltimore to:—Bath, 1.60; Boston, 1.60; Bridgeport, 1.45; Bristol, 1.50; Brooklyn, 1.30; Charleston, 80@1.00; Fall River, 1.45; Galveston, 3.00; New Bedford, 1.45; Newburyport, 1.85; New Haven, 1.45; New London, 1.45; New York, 1.30; Portland, 1.60; Portsmouth, N. H., 1.70; Providence, 1.45; Salem, 1.60; Savannah, 1.25; Somerset, 1.45; Williamsburg, N. Y., 1.30; Wilmington, 1.00. Freights firm.

From New York to:—Bath, Me, 1.35*; Beverly, 1.35*; Boston, 1.25*; Bridgeport, Conn., 75; Cambridge, Mass., 1.25*3c.; Cambridgeport, Mass., 1.25*3c.; Charlestown, $1.25*; Chelsea, 1.25*; Com. Pt., Mass., 1.35*; E. Boston, 1.25*; E. Greenwich, R. I., 1.00; Fall River, 1.00; New Bedford, 1.05; Newburyport, 1.40*; New Haven, 75; New London, 90.; Newport, 1.00; New York, 25§; Norwich, 1.00; Portsmouth, N. H., 1.35*; Providence, 1.00; Salem, 1.25*.

* And discharging. † And discharging and towing. 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. †† Pilotage. ** Below bridge. * Old B. L.

MARKETS.

NEW YORK, Friday Evening, Dec. 16.

Prices of Silver per ounce troy.

Dec.	Sterling exchange	Lond'n Pence.	N. Y. Cents	Dec.	Sterling exchange	Lond'n Pence.	N. Y. Cents
10	4.84½	44 1-16	95½	14	4.84½	44⅜	96⅛
12	4 84½	*	95⅜	15	4.85	44 ⅝	96⅜
13	4.84½	44 5-16	95⅞	16	4.85	†	96¾

* 44⅛@¼. † 44 11-16.

Market strong, owing to inquiries from London, presumably on Eastern account.

Sales of Silver Bullion Certificates were made December 16th as follows: 14,000 at '97. This silver certificate scheme made, as we predicted it would, a complete fiasco. They are never heard of and no one wants them.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains at 4 per cent. During the week, the bank gained £134,000 bullion, but the proportion of its reserve to its liabilities was reduced from 46·93 to 46·18 per cent, against a reduction from 45¼ to 43⅛ per cent in the same week of last year. On the 15th inst. the bank gained £25,000 bullion on balance. The weekly statement of the Bank of France shows a decrease of 3,200,000 francs gold and a loss of 200,000 francs silver.

The advance in the metal market continues with unabated vigor, and operations have been conducted on such an extensive scale that it is still impossible to predict with any degree of probability the extent to which the movement may be carried.

Copper.—In reviewing the course of this article, it must, of course, be borne in mind that the natural effect of such an enormous rise in value must be in the direction of increasing production, and sooner or later this influence will, of course, be felt, but no such increase can be brought about before the Spring, and even then only to a limited extent. If, however, the present range of prices should continue for any considerable time the market would then no doubt have to face a greatly increased production. This subject is discussed editorially on another page.

In this market consumers are doing hardly anything, and it is somewhat remarkable that they should be able to keep out of the market to such an extent as they have been. On the Metal Exchange, however, the transactions have again been very heavy, and prices have, during the week, risen from day to day, the aggregate quantity turned over being about 3,000,000 lbs.; during the week prices have fluctuated somewhat, as follows: Spot Lake Copper, Monday, 17c.; Tuesday, 17·40; Wednesday, 17·50; Thursday, 17·60; Friday, 17·65; and we close cash, 17·65; January, 18; February, 18·05; March, 18·10; April, 18 15. For delivery July-December of next year, 16·60 was bid, but no sellers have been forthcoming. The market for outside brands have again shown an increased margin of difference with Lake prices, and casting copper is quoted about 15¼ to 15½. We hear of some spot Orford, electrolytic having been sold at 17¾.

We hear of sales of refined casting copper in Europe at a price nearly six pounds *below* Chili bars, while a sale from second hands of 500 tons of Lake ingot for export f.o.b. New York at £81 per ton, which is equivalent to about 17½ cents per pound is reported. This was taken to prevent a break in the market here.

These straws show the direction of the current, and indicate a lack of confidence in the stability of the boom. Nevertheless, high prices may continue for ome time.

We learn that large quantities of Anaconda matte are being offered in Europe for delivery through the summer, and to-day cable advices say that 13s. 6d. per unit has been bid for it.

In London, Chili Bars were quoted on Saturday last £71 12s. 6d., and they closed on Monday at £73 5s.; Tuesday, £74 15s.; Wednesday, £77; Thursday, £80 5s.; Friday, £80 10s.

From London our advices show that Chili Bars are cornered and that fine copper of all descriptions can be purchased several pounds per ton below the price of Chili Bars. In fact we hear that Best Select was retailing yesterday in Birmingham at £73, and it is also reported that consumers are only placing orders very sparingly. Some interest is however shown in furnace material, the supplies of which appear to be rather scarce. The rumors that the cholera is interfering with the production in Chili are now viewed with more credulity. Messrs. Henry R. Merton & Co. estimate the clearance in the statistics for the first half of December at 1200 tons.

The exports of copper during the week were as follows:

	Bags.	Lbs	
To Liverpool—			
By S.S. Italy—Matte	2,356	471,200	$18,888
" City of Chester	1,684	210,750	11,000
" Arabic	9,364	1,112,860	60.000
" City of Richmond	1,713	199,940	10 000
" Celtic	4,265	509,707	26,700
" The Queen	2,924	354,911	18,000
" Alaska	3,871	466,970	24.000
	Bars copper.		
" City of Richmond	889	56,000	7,840
To Havre—	Casks.		
By S.S. La Bretagne—Copper	57	73,359	$7.600
" Chateaux Lafitte	65	81,250	8.700
	Argentiferous bars.		
To Hamburg—			
" Polynesia—Copper	331	100,191	$16,000
" Servia	60	376	1,000

Tin.—Although transactions have been rather small, prices have been very firm, and higher prices have been paid for spot, viz.: 35½@¾c. and a few transactions have also taken place for January-February. We quote spot 35⅝c.; January, 35@35½c.; February, 33¼@33½c. The London market has ruled very strong during the week at £166 to £167 for spot, and £145 to £150 for 3 months forward delivery.

Lead.—This metal has fluctuated considerably. At the commencement of the week the foreign markets were rather depressed, and the price for Spanish lead gave way to £14 5s., but prices have since rallied, the latest being £14 5s., but with a somewhat undecided feeling. In the home market, the transactions have been small, and principally confined to speculative dealings. After business had been done at 4·80, for spot and 4·90 for February, a strong speculative demand has sprung up, and prices advanced to 5c. spot, 5¼ January, 5·15@5·17½ February, with buyers over.

Messrs. Everett & Post, of Chicago, telegraph to day as follows:

The market is still rising excitedly on account of large purchases by speculators. Western buyers are now coming to the front and are taking lead, especially argentiferous, liberally. Sales foot up for December, January and February 600 tons of argentiferous, at 4·95; 300 tons of refined argentiferous at 5·00, 350 tons common galena Missouri at 4·80@4·85. Foreign advices report lead excited.

Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows: Market remains about the same, if any thing a shade firmer, owing to a growing inquiry. At the close, 4·70 bid and 4·75@4·80 asked.

Spelter is exceedingly scarce, and higher prices have again been readily paid. We quote for domestic spot 5¾@5¾c. Foreign spelter for early delivery has only been obtainable in very limited quantities, which have been sold at 6c., while 6⅛@6¼c. is now asked, with very little offering.

Antimony has been excited. The London makers are quite sold out up to April next, and ask for April May delivery very high prices (£43 10s. to £46). There being scarcely any thing here on spot the small quantities which could be secured were eagerly competed for, and up to 11@11¼c. was paid, and 11½c. is now asked for Hallet's, while Cookson's is held for 13 to 14c.

Sheet Zinc.—Firm, at 6¾@7. Domestic, 5¼@5½.

Quicksilver.—The activity in the market continues, and the prices have shown a further advance. In London the price has ruled at £11 per flask, with an upward tendency, and here at from 70@75c. per pound.

Nickel remains in a satisfactory position, with quotations unaltered at 65c.

Chemicals.—The market for chemicals has been uneventful during the week, and there is no change anticipated for the near future. The holiday season has already brought its usual depressing effect on trade, and purchases are being postponed, where that is possible, until after the first of the year. Sal Soda is weaker and is now offered at 1@1·05c. for spot, and 5 cents less to arrive.

Bleach is also off a little, and spot can be had at $1·95 to $2.

Nitrate of soda is quiet, and spot lots are quoted at 2 10c., and to arrive, 2c. Alum is in good demand. Arsenic is worth 2¾ to 2⅞c. Brimstone is higher, but dull. We quote nominally for December, $22@$24 a ton, and February shipments, $20.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 16.

There are few new features of interest in the iron market. American pig-iron is unchanged, and all the business being done is in small lots for early delivery. Buyers do not appear to be in any hurry, and the opinion becomes stronger that prices for next year will not be higher than at present. Indeed, there are some indications that rather lower prices will prevail. This will doubtless be the case through the West, as the Lake Superior ores will be handled at lower freight rates, and the Eastern market will sympathize. Meantime No. 1 foundry brands continue very scarce and always in good demand. The speculative movement in Scotch iron continues. The failure of Moses Armstrong & Son, one of the largest Scotch iron houses, had only a temporary effect, and prices are again higher abroad; but little changed here. Freights have advanced to 10s., owing to the demand for room for large shipments of potatoes.

Bessemer pig and spiegel are lifeless. Blooms are entirely neglected at the present price of steel rails. Under the most favorable conditions, steel rails must sell at $35 to pay cost of manufacture from foreign blooms.

Steel rails are still quoted at $32@$33 at Eastern mills, with new sales of 20,000 tons reported for early spring delivery. The Pennsylvania Railroad order has not yet been placed, and there are numerous other large orders held in abeyance. The Bessemer Board of Control report that the sales for 1887 delivery up to December 1st amount to 1,898,444 tons; up to that time there had been delivered 1,726,108 tons. The allotments thus far made for 1888 amount to 848,032 tons, on which sales to December 1st amounted to 127,832 tons; but this latter figure includes 60,000 to 70,000 tons carried over from 1887. The actual deliveries of rails from American mills in 1887 will thus fall short of 1,800,000 tons, and it must be borne in mind that about 180,000 tons of these have been made from foreign blooms.

The mills will generally close for repairs in January. The Joliet mill will close December 23d, from lack of orders, it is stated.

Steel and iron plates are weaker, and quotations are reduced.

The demand for structural iron continues large, and several new orders have been placed.

Our quotations for old rails are purely nominal, in the absence of business. Some lots of tees and double heads are offered at $21@$21.50 without buyers. On the other hand it is maintained that any considerable quantity of old rails could not be bought for $22.50, or even higher.

We refer for detailed quotations to our weekly table of prices current.

Louisville. Dec. 13.

[Reported by GEO. H. HULL & Co.]

Buying in the Louisville market for the past week has been light. Purchasers desire to close the year with small inventories of stock, and the probable effects of an increase in prices after January 1st does not deter them from taking this course. There is a great scarcity of mill grades, and prices are correspondingly firm. Some furnaces are sold ahead on these grades for the whole of next year; others, though not sold ahead, decline to quote for extended delivery, having confidence in an improvement in prices. The prevailing prices are about the same as quoted last week, and are regarded by buyers as reasonable, but it is not expected that any sales of consequence will be made before the close of the year. Quotations for cash will be found in our weekly register of prices.

Pittsburg. Dec. 15.

[From our Special Correspondent.]

We have to report a continued dull market in the iron trade, and there does not appear to be much prospect of any immediate improvement. The demand was extremely light, confined entirely to supplying immediate wants, and while consumption continues, large consumers, as a rule, will carry no more stock than they can possibly help, until there is a decidedly better outlook for the product. In regard to prices, there is very little change since last report. Whatever change has taken place was in favor of buyers. As usual, the better grades of standard iron maintain prices far better than any other description, Pittsburg furnaces being most fancied, including Mill, Foundry and Bessemer, notwithstanding the limited demand. So far as can be ascertained there seems to be no disposition manifested among leading furnaces to make further concessions, and as the supply of the kind in question, here and at several furnaces, is down lower than it has been for some time, with several furnaces going out of blast for repairs, the feeling is becoming more general that if "hard pan" has not been reached, it must be very near that point. Besides, present prices are the lowest reached for some months. At the same time, there has been no decline in labor, coke, freight, or any thing connected with the manufacture of iron.

There is a wide difference in value between common and best brands of iron, which is owing to the fact that there is an over-supply of the former, and it is being pressed upon the market, whereas the owners of the latter have more faith in the future, having an abiding faith that prices will, at least, hold their own. So long as they hold on to that opinion concessions will not be made. One reason for the falling off in transactions being the holidays, and the 1st of January being close at hand, many leading dealers will postpone transactions on that account. Another drawback, the market has been halt-

WEEKLY REGISTER OF

CURRENT QUOTATIONS.

This list is the result of careful compilation and is destined to meet the demands of all classes of subscribers. The prices quoted are those actually ruling in our own and foreign markets. Manufacturers and importers will please give notice of all modifications not later than Friday noon each week.

CHEMICALS.

Acid—Sulphuric, 60°, per 100 lbs.. 80
Sulphuric, 66°, per 100 lbs 90
Hydrofluoric, per 100 lbs..... 95
Muriatic, 18°, per 100 lbs 1.15
Muriatic, 20°, per 100 lbs.... . . . 1.25
Nitric, 36°, per 100 lbs 4.00
Nitric, 42°, per 100 lbs.... .. .. 6.00
Alkali—36 p. c 1⅛
Refined, 58°..... ..... 1.25
Alum—Lump, per lb..... ..... 1¾
Ground, per lb 2
Lump per ton, Liverpool £5
Sulphate of Alumina £4 12 0
Aluminum—(Metallic), per lb...12 00
Ammonia—Sulph., per 100 lbs.. 3 00
Carb., per lb..... 7¾
Muriate, per lb..... 7
Antimony—Hallet's, per lb..... 8¼
Cookson's, per lb 9¼
Arsenic—Metallic, per lb..... 3·2
White, powdered, per lb..... 2¾
White, glass.. ....
Red, per lb 6½
White, at Plymouth, per ton..£21 0 0
Asbestos—American, p. ton..... 20 00
Italian, p. ton, c. i. f. L'pool ...£18 0 0
Asphaltum—P. ton 13.00
Prime Cuban, ₱ lb .. .. 5@6c.
Hard, ₱ ton..... ..... $28.00
Trinidad, refined, ₱ ton $30.00
Barium—(Metallic), per lb.....975.00
Barytes—Sulph.. Am. prime white 16.00
Sulph., foreign, floated, p. ton....19.00
Sulph., off color, p. ton 12.50
Carb., lump, f.o.b. L'pool, ton ...£3 0 0
No. 1, casks, Runcor " "£4 10 10
No 2, bags, Runcorn " " 3 15 0
Bismuth—(Metallic), per lb..... 2.40
Bleach—Over 35 p. c., per lb..... 2
Borax—Per lb 6¼
Refined at Liverpool, per ton..£26 10 0
Bricks—Pale, per 1,000 ..... 5.00
Jerseys, per 1,000 ..... 7.50
Haverstraw, per 1,000..... . .... 8.50
Front bricks, per 1,000, from.....10.00
Brimstone—*See Sulphur.*
Bromine—Per lb.... 36
Building Stone—Amherst freestone, per cu. ft., from.... 75
Brownstone, per cu. ft., from..... 1.00
Granite, rough, per cu. ft., from.. 45
Cadmium—(Metallic), per lb..... 1.45
Calcium—(Metallic), per oz.....150.00
Cæsium—(Metallic) .....
Cerium—(Metallic) per oz..... . 168
Cement—Rosendale, per bbl..... 1 00
Portland, American, per bbl..... .. 2 00
Portland, foreign, per bbl.... .... 2 25
Chalk—Per ton.... .... 3.00
Precipitated, per lb..... 4
China Clay—English, per ton....18.50
Southern, per ton 13.50
Chrome Yellow—Per lb 8
Chromium—(Metallic), per lb...200.00
Cobalt—(Metallic), per lb..... 7.00
Cobalt—Oxide, per lb.... ..... 2.15
Copper—Sulph. English Wks.,ton£13 10 0
Precip., English Works, unit..fluctuating
Copperas—Common, per lb ....$ 70
Best, per lb..... .. .. 1.20
Liverpool, per ton, in casks, £2... 1.20
Cream of Tartar—Am. 99 p. c. lb 35
Powdered, 99 p c 36
Didymium—(Metallic), per oz ..160.00
Emery—Grain, per lb 3½
Flour, per lb 2½
Erbium—(Metallic), per oz... ...140.00
Feldspar—Ground, per ton.....14.00
Fuller's Earth—Lump, per bbl. 95
Powdered, per lb 2
Gallium—(Metallic), per oz 3250.00
Glucinum—(Metallic) .....
Green—Emerald, per lb..... 25
Brunswick ....
Gypsum—Calcined, per bbl.. .... 1.25
Indium—(Metallic), per oz..... 158.00
Iodine—Resublimed..... 3.50
Iridium—(Metallic), per lb.....700.00
Kainit—Per ton..... ..... 7.75
Kaolin—*See China Clay.*
Lanthanum—(Metallic), per oz.175.00
Lead—Red, per lb..... 6
White, American, in oil, per lb.... 6½
White, English, per lb 7½
Acetate, or sugar of..... 12
Litharge—Powdered, per lb 5½
English flake, per lb..... 9
Lithium—(Metallic), per oz.....160.00
Magnesite—Syrian, per ton.. ...15.00
Magnesium—Per lb.... .... 4.00
Mineral Wool—Per lb 2
Mica—
In sheets according to size, 1st quality, ₱ lb..... .. ..
In sheets according to size, 2d quality, ₱ lb.... ....
Molybdenum—(Metallic) per lb. 6.00
Nickel—(Metallic), per lb.. .....125.00
Niobium—(Metallic), per oz.....128.00
Osmium—(Metallic), per lb 640.00
Palladium—(Metallic), per lb...512.00
Platinum—(Metallic), per lb...148.00
Phosphate Rock—S. Carolina, per ton f. o. b. Charleston..... 5.80
Ground, per ton f. o. b. New York.10.00
Canadian Apatite, lump, f. o. b. at shipping port, per unit..... 24
Manganese—lump, c. i. f. Liverpool, per ton.....£3 2 6
Per unit, up or down.... .....£0 1 3
Ground.... .....£6 0 0
Metallic, per lb 1.10
Mercury—*See Quicksilver.*
Mercuric-Chloride—(*Corrosive Sublimate*) per lb..... 55
Phosphorus—Per lb..... 70
Plumbago—Ceylon, per lb..... . 4
American, per lb..... 7
London, per cwt..... .....£0 15 0
Potassium—Metallic, per oz..... 2.00
Cyanide, per lb..... ....
Bromide, per lb..... 37
Chlorate, per lb..... 14
Carb. per lb..... 5
Caustic, per lb 7½
Iodide 2.10
Muriate, per 100 lbs..... 1.70
Nitrate, refined, per lb..... 6
Bichromate, per lb..... 10½
Sulphate, per 100 lbs..... .. .. 1.10
Yellow Prussiate, per lb.... 19
Red Prussiate, per lb... 42
Pumice Stone—Select lumps, per lb..... .. .. 2½
Original cks., per lb..... . ..... 1½
Powdered, pure, per lb... ..... 1¾
Pyrites—Non-cupreous, p. unit, s. 10
Quartz—Ground, per ton 18.00
Quicksilver—Per lb.. ....68@70c.
London, per flask of 75 ....£10 10s.
Rotten Stone—Powdered, per lb. 8½
Lump, per lb... 5
Eng., powdered, per ton £4
Lump, per ton..... ..... £5
Rhodium—(Metallic), per lb....512.00
Ruthenium—(Metallic), per oz. 112.00
Rubidium—(Metallic), per oz...200.00
Salt—Liverpool, ground, per bbl. 70
Turk's Island, per bbl 25
Salt Cake—Per 100 lbs..... 55
Saltpeter—Crude, per lb..... .. 4½
Refined, per lb.. 6
Silenium—(Metallic ....
Slate—Purple and green roofing, per 100 ft.... ..... 6.00
Red roofing, per 100 sq. ft... ....15.00
Black, roofing, per 100 sq. ft. ... 5.00
Soda Ash—Carb., 48 p. c., p. 100 lbs 1.30
Caustic, 48 p. c., per 100 lbs.. . . 1.35
Caustic, 50 p. c., per 100 lbs..... 1.38
Sal, English, per 100 lbs 1.00
Sal, American, per 100 lbs 1.15
Nitrate, per 100 lbs..... 2.00
Sodium—(Metallic) per lb..... 6.50
Spelter—See Zinc.
Strontium—(Metallic), per oz..128.00
Nitrate, per lb 10½
Sulphur—Roll, per lb..... .... 1½
Flour, per lb 1¾
Crude Brimstone, 2s., per ton....22.00
Crude brimstone, thirds, per ton..20.00
Talc—Ground French, per lb.. ... 1¼
Domestic, per lb..... 6
Domestic, per ton..... .....15.00
C. i. f. Liverpool, per ton..... £4 5 0
Tannin—Pure, per lb. .....
Tantalum—(Metallic) per oz... 144.00
Telurium—(Metallic) per oz.... 9.00
Thallium—(Metallic) per oz..... 3.00
Titanium—(Metallic) per oz....32.00
Thorium—(Metallic) per oz.....272.00
Tungsten—(Metallic) per oz..... 4.00
Vanadium—(Metallic), per oz..320.00
Vermillion—American, per lb... 50
English, per lb. 65
Vitriol—(Blue), Ordinary, per lb.. 4½
Extra, per lb 4¾
Yttrium—(Metallic), per oz ...144.00
Zinc Oxide—Am., Dry, per lb.... 4¼
Antwerp, Red Seal, per lb..... 5⅝
Paris, Red Seal, per lb 6⅛
Zirconium—(Metallic), per oz..240.00

IRON AND STEEL.

New York Prices.

American Pig-Iron,
No. 1 X .... $20.50@$21.50 at tidewater
No. 2 X..... $18 50@$19.50 " "
Forge..... ... $17@ . ..... " "
Scotch Pig—Coltness... .$22.00@$22.25
Clyde.. ..... 20.50@ 21.00
Dalmellington..... 20.00@ 20.50
Summerlee..... 22.00@ . ....
Gartsherrie..... ..... 21 50@ .....
Shotts..... ..... 21.75@ 22.00
By Cable to-day to the Metal Exchange:
Scotch Warrants..... 43s. 6d.
Coltness, at Glasgow .... 53s. .
Langloan, at Glasgow..... 51s. 6d.
Summerlee, at Glasgow..... 51s. 6d.
Gartsherrie, at Glasgow..... 48s. 6d.
Glengarnock, at Ardrossan..... 48s. 6d.
Dalmellington, at Ardrossan..... 45s. 6d.
Eglinton, at Ardrossan ... .45s.
Bessemer Pig—
Foreign, nominally..... $21.00
Domestic..... . ..... $19 at furnace
Spiegeleisen—
German, 20 per cent.. .. .. $26.00
English, 20 " " ..... $26 50@ 27.00
" 30 " " 31.00
Ferro Manganese..... 55.50
Steel Blooms..... 30.00@ 30 50
Steel Billets .... 30.00@ 30.50
Steel Nail Slabs.. ..... 30 50@ 31.00
Steel Wire Rods.. .... 40.75@ 41.00
Steel Rails—
Heavy sections, at mill....$32.00@ 33.00
Light " " .... 34.50@ 39 50
Structural Iron and Steel—
Bridge Plate, at mill.. .....2·20@2¼c.
Angles, at mill ....2·3@2·4c.
Tees, at mill..... ..... 2·6@2·8c.
Steel Angles, at mill..... ....2·6@2·75c.
Beams and Channels, on wharf, 3·3c. base.
Steel Plates—
Tank and Ship, on wharf..... 2·7@2·9c.
Boiler Shell, on wharf.... ....3 @3¼c.
" Flange, " ... ... 3¼ @3½c.
" Fire-Box, on wharf.....4 @4¼c.
Iron Plates—
Common tank, on wharf....2¼@2 3-10c.
Refined tank, on wharf.....2 4-10@2½c.
Boiler shell, " .... .2½@2 6-10c.
Boiler flange, " . ...3½@3 7-10c.
Extra flange, " .....4 @4¼c.
Bar Iron—
Refined..... .....2@2·1c. base.
Common..... 1·9@2c. "
Merchant Steel—
American tool .... 8½@10c.
Special grades..... 13 @20c.
Crucible machinery..... 5 @6c
" spring..... .... 4½c.
Bessemer machinery..... 2·2@2·5c.
" spring. . . .. 2·2@2·5c.
Cast-Iron Pipe—
According to size..... . $27 00@$34.00
Wrought-Iron Pipe—List adopted Oct. 26, 1887.
Butt-Welded, Plain and Tarred, 47½ per cent disc.; Galv., 37½ per cent disc.
Lap-Welded, Plain and Tarred, 57½ per cent disc ; Galv., 45 per cent disc.
Boiler Tubes—52½ per cent disc.; Casing, 50 per cent disc.
Rail Fastenings—
Spikes..... ... . 2·3 @2·4c.delv'd
Angle Fish-bars..... .2·10@2·15c.
Bolts and Sq. Nuts.....2·9 @ 3c.
" " Hex. " .....3·1 @3·2c.
Wrought Scrap—
Foreign *ex ship*.....$20.00@$20.50
No. 1 Yard .... 20.50@ 21.00
Cast Scrap .... 15.00@ 16.00
Old Car Wheels.... ... 19.00@ 19 50
Old Rails—Tees ... .@ 22.00
—Doubles ..... 22.00@ 22 50
Nails—In car-load lots. .. 1.90@ 2.00
—From store .... 2.00@ 2.05

Louisville Prices.

Pig-Iron—
So. Coke, No. 1 Foundry..$20.00@$20.50
" " No. 2 " .. 19.00@ 19.50
" " No. 2½ " .. 18.00@ 19.00
Hg. Rock Coke, No. 1 F'dry 19.50@ 20.50
" " Charcoal, No. 1 Foundry..... 22.50@ 24.00
So. Charcoal, No. 1 F'dry .. 20.50@ 21.50
Silver Gray, different gr'des 17.50@ 19.00
So. Coke, No. 1 Mill, Neutral 17.25@ 18.25
" " No. 2 " " 16.75@ 17.75
" " No. 1 Mill, Cold Short..... 16.75@ 17.75
So. Charcoal, No. 1 Mill..... .....
White&Mottled, diff't gr'ds. 15.00@ 16.00
So. Car-Wheel, St'rd Br'nds 24.00@ 25.00
" " Other " 22.00@ 23.00
Hanging Rock, Cold-Blast.. 24.00@ 25.00
" " Warm-Blast 20.00@ 21.00

Philadelphia Prices.

Foundry No. 1..... $21.00@22 00
Foundry No. 2. ..... 18.50@19.50
Gray Forge..... 17.00@. ....
Bessemer Pig..... 20.25@. ...
Steel Rail Blooms ..... 29.50@nom.
Foreign Bessemer..... 20.00@20.50
Spiegeleisen. ..... 26.50@27.50
Scrap, Selected..... 22.00@. ....
No. 1.... .... 21.00@. ....
Cargo Scrap..... ... . 21.00@.....
Muck-Bars.. .... 30.50@. ....
Merchant Iron..... ..... 1.90@@2.10c.
Plate Iron..... 2.20@ 2.40
Tank Iron..... 2.40@ 2.50
Skelp Iron..... 2.00@.....
Angles... ..... 2.30@. ...
Beams and Channels..... .. 3.30@. ....
Nails .... 1.90@ 2.00
Steel Rails. .... 32.50@33.50
Old Rails..... 22.00@22.50

Pittsburg Prices.

Coke or Bituminous Pig—
Foundry No. 1..... ....$19 00@19.50
Foundry No. 2..... .... 18.00@18.75
Gray Foundry No. 3..... 17.00@17.50
" " No. 4... .. ... 16.50@17.00
White .... 16.50@16.75
Mottled..... 16.50@16.75
Silvery 19.00
Bessemer..... ..... 19.00@19.25
Charcoal Pig—
Foundry No. 1. .... 25.00@25.75
Foundry No. 2..... . . 24.00@24.75
Cold-Blast..... ..... 26.00@30.00
Warm-Blast..... .... 25.00@27.00
20 p. c. Spiegel..... 28.00@28.50
Muck-Bar..... ..... 29.25@29.50
Steel Blooms..... 29.00@
Steel Slabs ..... 29.00@29.50
Steel Crop Ends.... .... 20.00
Steel Bloom Ends.. ..... 19.50@20.00
Steel Billets..... ..... 29.00@29.50
Old Iron Rails... .... 24 50@25.00
Old Steel Rails..... .... 21.75@22.50
No. 1 W. Scrap..... ..... 20 00@20.25
No. 2 W. Scrap.... .... 18.00@18.25
Steel Rails..... .... 33.00@34.00
" light sections... ..... 33.00@37.00
Bar Iron, nominal..... 1.90@ 2.00
Nails $2 net car lots.
Steel Nails $2 net car lots. Two per cent off for cash.
All descriptions of iron are nominal. Steel rail men refuse to alter figures, and report no demand, prices being uncertain.

ALUMINUM.

Bronze (10 %), ₱ lb..... 40c.

COPPER.

Lake Ingot, ₱ lb.... ....15@16c.
Electrolytic, ₱ lb ... . 17c.
Casting Brands, ₱ lb ... . 15c.
Arizona Black.....
Matte, ₱ unit of Copper .....
Chili Bars, London, ₱ ton.....£67 15s.
Am. Matte, Liverpool, ₱ unit....
Sheet Copper (according to size), ₱ lb..... .....20 @33c.

Lead—
Domestic, Common..... 5¼c.
Domestic, Refined ....
Foreign .... 5½c.
Sheet, ₱ lb..... ..... 6 @ 7c.
Pipe, ₱ lb .. .. @ 7c.
Tin lined Pipe, ₱ lb.....15c.
Shot, ₱ lb..... 6 @ 7c.

Tin—
Banca pigs, ₱ lb..... .. ..
English, pigs, ₱ lb ....
Straits, pigs, ₱ lb .....
Straits in bars, ₱ lb.....
Ch., bright I. C., ₱ box.....
Coke, bright, ₱ box. .....
Coke, Ternes, ₱ box.....

Zinc—
Domestic spel'er, ₱ lb. .....
Foreign spelter, ₱ lb... . .....
Silesian, London, ₱ ton..... £
Sheet, American, ₱ lb .. ..
Sheet, foreign, ₱ lb.....

STOCK MARKET QUOTATIONS

Baltimore Stock Quotations.

COMPANY.	Bid.	Asked.
Atlantic Coal....	$1.45@$1.55	$1.60@$2.00
Balt. & N. C.	.35@.37	.40@.45
Big Vein Coal..	....	....
Conrad Hill . ..	.10@.15	.18@.20
Diamond Tunnel	.50	....
George's Crk. C..	.92½@ 98	1.00¼@1.05
Lake Chrome..	.10	.15@.20
N. State, Balto..	.20@.40	.70
Ore Knob	.10@.12	....
Silver Valley....	1.50	....

Highest and lowest prices bid and asked during the week ending December 15th.

Birmingham, Ala., Stock Quot.

COMPANY.	Bid.	Asked.
Ala. Conn. C..	....	100
Bir. Min.& Mfg.	175 @197½	220
Decat. L. Imp. & Fur.....	24 @ 25½	24¾@ 26¼
DecaturMin.L.	....	30 @ 30½
Enterprise Mfg	..	....
Sloss I. & S....	....	....
* Sloss I. & S..	....	....
Sheffield C & I.	68 @ 71	72
WoodstockS&I	....	52½@ 53

* Bonds.

Highest and lowest prices bid and asked December 13th.

Deadwood-Dak. Quotations.

Comp'y.	H.	L.	Comp'y.	H.	L.
Bullion...	.04	.02	Mugw'mp	...	..
C'nt'e Sh't	.02	.01¼	Poc'h'ntas	...	..
Cora	.02	..	Rattler. .	.16	.06
Ent'rp'se.	.02	.02	Ruby Bell	.05	.03
Eureka ..	...	...	Seabury..	...	...
Hester A.	.07½	.05	Seg'eg'ted	..	...
Iron Hill.	1.25	1.00	Silv'rRid'e	.05	.01¼
Jefferson.	.15	...	Sp'nish R.	.26	.21
Liberty ..	...	...	U.S.Gr'nt	...	...
Minna....	.02	.01	West Va . .	.02	...
Mutual. ..	.07	.01½			

Highest and lowest prices bid and asked during the week ended December 8th.

Pittsburg Stock Quotations.

COMPANY	H.	L.	Closing.
Bridgewater Gas ..	99.00	99.00	99.00
Chartiers Val. Gas.	80.00	70.00	80.00
Columbia Oil Co..	.....	.. ..	.....
Consignee Min. Co.	.....	.....	.....
Forest Oil Co	.....	.....	.....
Gogebic Iron Synd.	.....	.....	.... .
Hazlewood Oil Co.	.....	.....	.....
Iron City Min. Co:	.....	.....	.....
La Noria Mining ..	3.25	2.75	3.12½
M'f'turers' Gas....	.....	.....	....
Mansfi'd C.& C.Co.	.....	.....	.....
Nat.Gas Co.,W. Va.	.....	.....	.....
N. Y. & Cleve. Gas Coal.....	...	....	.....
Ohio Valley Gas...	45.00	43.00	45.00
Pennsylvania Gas.	25.00	25.00	25.00
People's Nat. Gas..	... ..	.....	.....
Philadelphia Gas..	48.63	47.25	48.63
Pine Run Gas Co..	.....	.....	.....
Silverton Mining..	3.00	3.00	3.00
South Side Gas.. .	.....	.....	.....
Tuna Oil Co.....	.....	.....	.....
W't'h'se Air-Brake.	134.00	137.00	137.00
W't'ghouse Brake.	56.50	56.50	56.50
Westmoreland & Cambria Gas..	49.00	49.60	49.00
Wheeling Nat. Gas.	25.25	24.25	24.37
Yankee Girl Mining	....		.....

Highest and lowest prices bid and asked during the week ending December 15th.

London Quotations.

COMPANY.	Highest.	Lowest.
Alturas Gold, Idaho...	19s.	18s.
Anglo-Montana, Mont..	...	...
Arizona Copper, Ariz..	15s.	12s.
Birdseye Creek, Cal....	8s.	6s.
California Gold, Colo..	8s. 6d.	7s. 6d.
Carlisle, N. Mex	£1¼	£1
Centennial, Cal.	...	...
Charles Dickens, Id....	3s. 3d.	2s. 9d.
Colorado United, Colo..	20s.	15s.
Denver Gold, Colo.....	2s.	1s.
Eberhardt, Nev	5s.	4s.
Empire, Mont	£2⅜	£2¾
Flagstaff, Utah.....	7s.	6s.
Garfield, Nev.....	25s.	23s.
Gold Hill, N. C.....	3s. 6d.	2s. 6d.
Kohinoor, Colo.....	2s. 6d.	1s. 6d
Montana Lt., Mont	£3¾	£3⅜
New California, Colo...	8s. 6d.	7s. 6d.
New Consolidated	2s. 6d.	2s.
New Emma, S., Utah...	5s.	4s. 6d.
New Hoover Hill, N. C.	3s.	2s.
New La Plata, Colo....	3s. 6d.	2s. 6d.
Pittsburg Cons., Nev...	31s.	30s.
Plumas Eureka, Cal....	£⅝	£⅜
Richmond Con., Nev...	£5	£4¾
Ruby&Dunderberg, Nev	4s. 6d.	3s. 6d.
Russell Gold, N. C.....	3s. 6d.	2s. 6d.
Sierra Buttes, Cal....	22s. 6d.	17s. 6d.
Stanly, N. C.....	£1	£⅞
Union Gold, Colo.....	6s.	4s.
U. S. Placer, Colo.....	£1	£¾
Viola Lt., Idaho	£1 7-16	£1 5-16

Highest and lowest prices December 3d.

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par	Assessments. Total levied.	Assessments. Date and amount of last			Dividends. Total paid.	Dividends. Date and amount of last			
1	Adams, S. L.	Colo.	$1,500,000	150,000	$10	*				$555,000	Jan	1887	15	
2	Alice, S. C.	Mont	10,000,000	400,000	25	*				750,000	Sept	1886	.06¼	
3	Alturas, G	Idah.	1,500 000	3 0,000	5					95,000	Sept	1886	.50	
4	Amie Con., S. L.	Colo.	5,000,000	500,000	10	*				330,000	Oct.	1883	.05	
5	Amy & Silversmith, S.	Mon.		341,419						247,530	Aug	1887	.12½	
6	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	360,000	Jan.	1887	1.00	
7	Argenta, S	Nev.,	10,000,000	100,000	100	295,000	July	1885	.10	40,000	Feb.	1880	.20	
8	Aurora, I.	Mich	2,000,000	100,000	20					155,000	Oct	1887	1.87½	
9	Bassick, G. S.	Colo.	10,000,000	100,000	100	*				400,000	Mar.	1884	1.00	
10	Belle Isle, S.	Nev.,	10,000,000	100,000	100	160,000	Feb	1887	.20	300,000	Dec.	1879	.25	
11	Belcher, G. S.	Nev.,	10,400,000	104,000	100	2,269,335	Sept	1887	50	15,397,000	Apl.	1876	1.00	
12	Bellevue Idaho, S. L.	Idah.	1,250,000	125,000	10	57,500	Nov.	1887	25	200,000	Jan	1887	.10	
13	Big B'nd Hydraulic, G	Dak.,	1,000,000	200,000	5	*				258,000	Aug	1887	.03	
14	Black Bear, G.	Cal.,	3,000,000	30,000	100	22,500	Dec.	1884	.25	895,000	May	1883	.20	
15	Bodie Con., G. S.	Cal.,	10,000,000	100,000	100	424,990	Aug	1887	.50	1,602,572	Apl.	1885	.50	
16	Bonanza Developm't	C & M	3,000,000	400,000	10					135,000	Oct.	1882	.15	
17	Bonanza K'g, Cons. S.	Cal.,	1,000,000	100,000	10	*				185,000	Feb.	1885	.10	
18	Boston & Mont, G.	Mont	2,500,000	250,000	10	*				520,000	Jun	1886	.15	
19	Breece, S.	Colo.	5,000,000	200,000	25	*				2,000	Feo.	1880	.01	
20	Brooklyn Lead, L. S.	Utah	500,000	50,000	10					127,000	July	1887	.05	
21	Bulwer, G.	Cal	10,000,000	100,000	10	60,000	July	1887	20	175,006	Jan.	1884	.10	
22	Caledonia, G.	Dak	10,000,000	100,000	100	505,000	May	1885	.15	40,000	Feb.	1886	.10	
23	Calumet & Hecla, C.	Mich	2,500, 00	100,000	25	1,200,000				29,350,000	July	1887	5.00	
24	Carbonate Hill, S. L.	Colo.	2,000,000	200,000	10	*				80,006	Apl.	1884	.05	
25	Caribou Con., S.	Colo.	1,500,000	150,000	10	*				50,000	Mch	1880	.10	
26	Castle Creek, G.	Idah.	100 000	100,000	1					51,000	Oct.	1883	.03	
27	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*				270,000	May.	1884	.10	
28	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,820,000	Feb.	1887	2.00	
29	Christy, S.	Utan	10,000,000	100,000	100					10,000	Jun.	1885	.10	
30	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1,650,000	Dec.	1884	.25	
31	Colorado Central, S. L	Colo.	2,750,000	275,000	10	*				241,375	Nov.	1887	.05	
32	Cons. Cal. & Va., G. S	Nev.,	21,600,000	216,000	100	108,000	Jan.	1885	.20	1,252,000	Dec	1887	.50	
33	Con. Gold Mining, G.	Ga.,	500,000	100,000	5					108,000	Nov.	1883	02	
34	Contention, S.	Ariz.	12,500,000	250,000	50					2,587,000	Dec.	1884	.25	
35	Crescent, S. L. G.	Utah	15,000,000	300,000	25	*				210,000	Aug.	1886	.05	
36	Crown Point, G. S.	Nev.,	10,000,000	100,000	100	2,675,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00	
37	Daly, S. L.	Utah	3,000,000	150,000	20					375,000	Nov.	1887	.50	
38	Deadwood-Terra, G.	Dak.,	5,000,000	200,000	25					11,000,000	Nov.	1887	.10	
39	Derbec B. Grav., G. S.	Cal.,	10,000,000	10 0,000	100	90,000	Dec.	1881	.10	180,000	May	1887	.10	
40	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*				250,000	Oct	1887	10	
41	Elkhorn, G. S.	Mont	1,000,000	100,000	10	50,000	July	1883	.50	180,000	July	1887	.05	
42	Empire Lt., G.	Mont	5 0,000	103,000	5					33,000	Mar	1887	.05	
43	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	500,000	July	1886	1.00	4,868,000	Dec	1887	.25	
44	Evening Star, S. L.	Colo.	500,000	50,000	10					1,400,000	Nov	1883	.50	
45	Excelsior, G.	Cal.,	10,000,000	100,000	100	560,000	Sept	1885	1.00	875,000	Oct.	1880	.25	
46	Father de Smet, G.	Dak.,	10,000,000	100 000	100	200,000	Nov	1878	1.00	1,125,000	Dec.	1885	.20	
47	Franklin, C.	Mich	1,000,000	40,000	25	220,000	Jun.	1871		560,000	Dec.	1886	1.00	
48	Freeland, G. S. C.	Colo.	5,000,000	200,000	25	*				190,000	July	1886	.10	
49	Fresno Enterprise, G	Cal.,	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10	
50	Garfield Lt., G. S.	Nev.	500,000	100,000	5					25,000	Mar.	1885	.12½	
51	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	4,213,400	Nov.	1887	.50	3,826,000	Oct.	1870	10.00	
52	Grand Central, S.	Ariz.	1,000,000	100,000	10					625,000	Dec.	1882	.25	
53	Grand Prize, S.	Nev.	10,000,000	100,000	100	570,000	Apl.	1886	.50	495,000	Mar.	1884	.25	
54	Granite, S.	Colo.	125,000	125,000	1					6,250	May	1883	.01	
55	Granite Mountain, S.	Mont	10,000,000	400,000	25					3,600,000	Dec.	1887	.50	
56	Green Mountain, G.	Cal.,	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½	
57	Hale & Norcross, G. S	Nev.,	11,200,000	112,000	100	5,086,800	July	1887	.50	1,598,000	Apl.	1871	5.00	
58	Hall-Anderson, G.	N. S.,	150,000	150,000	1					7,000	Jan.	1882	.05	
59	Hecla Con., S. G. L. C.	Mont	1,500,000	30,000	50					1,047,000	Aug	1886	.50	
60	Hel'a Mg & Red, G. S. L	Mont	3,315,006	663,000	5	*				197,97	July	1886	.08	
61	Holmes, S.	Nev.,	10,000,000	100,000	100	300,000	Sept	1885	10	75,000	Apl.	1886	.25	
62	Holyoke, G.	Idah	200,000	200,000	1					27 000	Feo.	1883	.10	
63	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	3,968,750	Nov	1887	.20	
64	Honorine, S. L.	Utah	5 0,000	250,000	2	35,000	Jun.	1883		125,000	Sept	1887	.05	
65	Hope, S.	Mont	1,000,000	100,000	10	*				183,252	Oct.	1887	.25	
66	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				4,000,000	Nov.	1884	.50	
67	Idaho, G.	Cal.,	310,000	3,100	100					4,539,500	Apl.	1887	5.00	
68	Ideal, S. L.	Colo.	1,500,000	50,000	10					15,000	Oct.	1886	.05	
69	Illinois, S.	N. M.	100,000	100,000	1					25,000	Jan	1887	.25	
70	Independence, S.	Nev.,	10,000,000	100,000	100	340,000	Oct.	1886	.20	225,000	Sept	1879	.25	
71	Indian Queen, S.	Nev.,	250,000	125,000	2					368,750	July	1883	03	
72	Invo, G.	Cal.,	500,000	100,000	5	*				45,000	Apl.	1887	.05	
73	Iron Hill, S.	Dak.	2,500,000	250,000	10	82,500	Oct.	1885		156,250	Nov.	1887	.07½	
74	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20					2,100,000	Oct.	1887	.20	
75	Jackson, G. S.	Nev.,	5,000,000	50,000	100	10,000	Nov	1880	.20	45,000	Oct.	1886	.10	
76	Jocuistita, S.	Mex.	2,500,000	250,000	10					1,200,000	Feb.	1885	.50	
77	Jumbo, G.	Colo.	2,000,000	200,000	10					15.000	Jun.	1887	.02½	
78	Kentuck	Nev.,	3,000, 00	30,000	100	342,000	Nov	1881	.30	1,600,000	Dec.	1886	.10	
79	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30	
80	Leadville Cons., S. L.	Colo.	4,000,000	400,000	10	*				433,000	Apl.	1887	.05	
81	Lexington, G. S.	Mont	4,000,000	40,000	100	*				585,000	Jan.	1885	2.00	
82	Little Chief, S. L.	Colo.	10,000,00	200,000	50	*				780,000	Mch	1885	.10	
83	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*				1,050,000	Mch.	1880	50	
84	Manhattan, S.	Nev	5,000,000	50,000	100	300,000	Jun	1887	1.00	437,500	Feb	1886	.25	
85	Marguerite, G.	Cal.,	500,000	25,000	20					18.750	Oct.	1882	.25	
86	Marion Bullion, G	N.C.	500,000							15.000	Jan.	1886		
87	Martin White, S.	Nev.,	10,000,000	100,000	100	1,150,000	Mar.	1886	25	140.000	Dec.	1886	.25	
88	Mary Murphy, G. S.	Colo.	350,000	3,500	100	*				87,500	Sept	1887	5.00	
89	Minnesota, C.	Mica	1,000,000	40,000	25	420,000	Apl.	1886	1 00	1,826,000	Mar.	1876		
90	Mono, G	Colo.	5,000,000	5 0,000	100	610, 00	Sept	1887	.50	12.500	Mar.	1887	.25	
91	Montana, Lt, G. S.	Mont	3,300,000	330,000	5	*				1,247,400	July	1887	.75	
92	Morning Star, S. L.	Colo.	1,000,000	100,000	10					750,000	Nov.	1887	.25	
93	Moulton, S. G.	Mont	2,000,000	100,000	5	*				380,000	Dec.	1887	.07½	
94	Mount Pleasant, G.	Cal.	150,000	150,000	1	*				150,000	Feb.	1887	.30	
95	Mt. Diablo, S.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	80,000	July	1885	.20	
96	Napa, Q	Cal.,	700,000	100,000	7					290,000	Jan.	1883	.10	
97	Navajo, G. S.	Nev.,	10,000,000	100,000	100	45 ,000	Mar.	1887	30	325,000	Feb.	1885	.25	
98	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*				30,000	Dec.	1885	.06½	
99	New York Hill, G.	Cal.,	5,000,000	50,000	100	62,500	Oct	1885	.15	215,000	Aug.	1882	.10	
100	Northern Belle, S.	Nev.,	5,0 0,000	50,000	100	425,000	Jan.	1884	8.30	2,400,000	Apl.	1883	50	
101	North Belle Isle, S.	Nev.,	10,000,000	100,000	100	250,000	Mar	1887	.50	30,000	Aug.	1881	.15	
102	Ontario, S. L.	Utah	15,000,000	150,000	100					8,75 ,000	Nov.	1887	.50	
103	Opair, G. S.	Nev	10,000,000	100,000	100	4,057,800	Aug	1887	.50	1,595,000	July	1882	1.00	
104	Original, S. C.	Mont	1,500,000	60,000	25	*				126.000	Oct.	1887	.05	
105	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,072,500	Dec.	1887	1 00	
106	Oxford, G.	N. S.	125,000	125,000	1	*				34,500	Oct.	1885	.02	
107	Paradise Valley, G. S	Nev.	10,000,000	100,000	100	47,000	Mar.	1882	.15	150,000	Apl.	1887	.10	
108	Parrott, C.	Mont	1,800,000	180,000	10					54,000	ct.	1887	.10	
109	Peacock, S. G. C.	N.M.	2,000,000	200,000	10	*				30,000	Nov.	1886		
110	Pleasant Valley, G. S.	Cal.,	10,000,000	100,000	100	10,000	Mar.	1881	.10	30,000	Dec.	1882	.05	
111	Plutus, G. S. C. L.	Colo.	2,000,000	200,000	10	*				20.000	Feb.	1886	.10	
112	Plymouth Con., G.	Cal.,	5,000,000	100,000	50	*				2,240,000	Jan.	1888	.40	
113	Prussian, S. L.	Colo.	1,500,000	150,000	10					132,000	Jan.	1885	.10	
114	Quicksilver, pref., Q.	Cal.,	4,300,000	43,000	100					914,150	Aug.	1887	1.50	
115	" com., Q.	Cal.,	5,700,000	57,000	100					151,000	July	1882	.40	
116	Quincy, C.	Mich	1,000,000	40,000	25	200,000	Dec.	1862		4,610,000	Aug.	1887	1.00	
117	Richmond, S. L.	Nev.,	1,350,000	54,000	25	*				4,312,587	Jun.	1887	1.25	
118	Ridge, C.	Mich.	5 0,000	20,000	25	220,000	Mar	1886	.50	100,000	Feb.	1889	.50	
119	Rising Sun, S.	Dak.,	750,000	150,000	5	*				52,000	May	1881	.07½	
120	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*				585,000	Mar.	1886	.05	
121	Robert E. Lee, S. L.	Colo	10,000,000	500,000	20					100,000	Dec.	1882	.50	
122	Rooks, G.	Vt.	500,000	50,000	10	*				61,000	Apr	1885	.30	
123	Savage, S.	Nev.,	11,200,000	112 000	100	3,324,000	Sept	1887	50	4,460,000	July	1869	3.00	
124	Security L. Mg, Mfg.	Colo.	1,000,000	100,000	10	*				50,000	July	1884		
125	Shoshone, G.	Idah.	150,000	150,000	1					7,500	Apl.	1883	.01	
126	Sierra Buttes, G.	Cal.,	225,000	22,500	10					1,477,245	Oct.	1887	.31½	
127	Sierra Grande, S.	N. M.	2,5 0,000	500,000	5					860,000	Sept	1884	.25	
128	Sierra Nevada, G. S.	Nev.,	10,000,000	100,000	100	6,287,000	Dec.	1887	.25	102,000	Jan.	1871	1.00	
129	Silver Cord, G. S. L.	Colo.	5,000,000	500,000	10					225,000	Nov.	1883	.25	
130	Silver King, S.	Ariz.	10,000,00	100,000	100					2,000,000	July	1887	.25	
131	Silverton, G. S. L.	Colo.	2,000,000	200,000	10	*				76,000	Nov	1886	.02	
132	Small Hopes Cons., S.	Colo.	5,000,000	250,000	20	*				3,062,500	Nov.	1887	.20	
133	Smuggler, S. L.	Colo.	600,000	60,000	10					66,700	Aug.	1883	.25	
134	Socorro, C.	N. M.	250,000	2,500	100					4,000	Mca	1882	.00¾	
135	South Yuba, G.	Cal.	2,000,000	0 0 0	50	*				150,000	Oct.	1881	.75	
136	Spring Valley, G.	Cal.,	2,00 ,00	2 0,000	1	50,000	Oct.	1886	.25	50,0 0	Jan.	1881	.25	
137	Standard, G. S.	Cal.,	10 00,00	1 0,000	100	25,000	Oct.	1884	.25	3,545,000	Dec.	1887	.10	
138	Stormont, S.	Utah	500,0	5 0,000	1	*				15 ,000	Nov.	1881	.05	
139	St. Joseph, L.	Mo.,	1,5 0,00	150,000	10	*				844.000	Dec.	1887	.20	
140	Surinam, G.	D. G.	3,000,000	2 0,000	5					105,0 0	Nov.	1887	.05	
141	Syndicate, G.	Cal.,	10,000,000	1 0,000	100	33,724	July	1883	.15	48,308	Sept	1886	.10	
142	Tip Top, S.	Ariz.	10,000,000	100,0 0	100	250,000	Sept	1883	.25	100,000	Nov.	1881	.20	
143	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10	
144	United Verde, C.	Ariz.	3,000,000	300,000	10	*				97,500	Feb.	1884	.20	
145	Valencia, M.	N. M.	150,000	1,500	100	*				37,500	Apl	1886	2.50	
146	Viola Lt., S. L.	Idah.	750,000	150,0 0	5	*				74,500	May	1887	.12½	
147	Vizina, S.	Ariz.,	5,000,000	200,000	25	*				140,000	Apl.	1882	.10	
148	Yankee Girl	Colo.	2,500,000	250,000	10					1,087,500	July	1887	.10	
149	Yellow Jacket, G. S.		12,000,00	120,000	10	5,448 000	Dec	1885	.75	2,184,000	Aug.	1871	1.50	

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par Value.	Assessments. Total levied.	Assessments. Date & am'nt of last,			
1	Agassiz Cons., S. L.	Colo.	$2,500,000	50,000	$50	*				
2	Albion, S. L.	Nev.,	15,000,000	150,000	100	$577,000	July	1882	.25	
3	Allouez, C.	Mich	2,000,000	80,000	25	240,000	Feb	1884		
4	Alpha Con., G. S.	Nev.,	3,000,000	30,000	100	460,000	Aug.	1887	.50	
5	Alta, S.	Nev.,	10,000,000	100,000	100	2,074,400	Nov	1887	.50	
6	Amador, G.	Cal.,	400,000	200,000	2	*				
7	American Flag, S.	Colo.	1,250,000	125,000	10	300,000	Jun	1877	.50	
8	Anglo-Montana, Lt.	Mon.	600,000	120,000	5					
9	Appalachian, Lt., G.	N. C.	1,500,000	300,000	5					
10	Aspen Mg. & S., S. L	Colo.	2,000,000	200,000	10					
11	Barcelona, G.	Nev.,	5,000,000	200,000	25	*				
12	Bechtel Con., G.	Cal.,	10,000,000	100,000	100	173,500	Jan.	1883	.10	
13	Belmont, S.	Nev.,	5,000,000	50,000	100	735,000	Apl.	1886	.10	
14	Best & Belcher, G. S.	Nev.,	10,080,000	100,800	100	1,800,590	Aug.	1887	.50	
15	Big Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*				
16	Bi-Metallic, S.	Mon.	5,000,000	200,000	25	*				
17	Black Jack, G.	Cal.,	250,000	100,000	2½					
18	Boston Con., G.	Cal.,	10,000,000	100,000	100	170,000	Nov	1883	.25	
19	Bradshaw, S.	Ariz.	2,250,000	225,000	10					
20	Brunswick, G.	Cal.,	2,000 000	400,000	5	*				
21	Bullion, G. S.	Nev.,	10,000,000	100,000	100	5,050,000	Aug.	1887	.50	
22	Bve and Bye	Ariz.	1,000,000	100,000	10	*				
23	Calaveras, G.	Cal.,	500,000	500,000	1	*				
24	Carisa, G.	Wy	500,900	100,000	5	*				
25	Cashier, G. S.	Colo.	500,000	250,000	2	*				
26	Cen Contin'l, G. S. L.	C. & A	2,000,000	200,000	10	*				
27	Charles Dickens, G. S.	Idah.	1,250,000	250,000	5	*				
28	Cherokee, G.	Cal.,	1,500,000	150,000	10					
29	Chollar, S.	Nev.,	11,20 ,0 0	112,000	100	1,208,000	Dec.	1887	.50	
30	C nnamon Mt., G. S.	Colo.	750,000	150,000	5	*				
31	Climax, S. L.	Colo.	2,000,000	200,000	10	*				
32	Colorado No. 2, S. L	Colo.	100,000	10,000	10	*				
33	Comstock, G. S.	Nev.,	10,000,000	100,000	100	30,000	Mar.	1887	.15	
34	Con. Imperial, G. S.	Nev.,	5,000,000	50,000	100	1,175,000	Sept	1887	.25	
35	Con. Pacific, G.	Cal.,	6,000 000	60,000	100	183,000	Sept	1887	15	
36	Cons Silver, S.	Mo.,	2,500,000	250,000	10					
37	**Con. Queen Cons, C.	Ariz	1,400 00	140,000	10					
38	Courtlandt	Colo.	500,000	50,000	10					
39	Crescent, S. L.	Colo.	3,000,000	300,000	10	*				
40	Crocker, S.	Ariz.	10,000,000	100,000	100	75,000	May	1887	.10	
41	Crowell, G.	N. C.	500,000	500,000	1					
42	Dahlonega, G.	Ga.,	250,000	250,000	1	*				
43	Dandy, S.	Colo.	5,000,000	500,000	10					
44	Dardanelles, G.	Cal.,	1,000,000	100,000	10					
45	Decatur, S.	Colo.	1,500,000	300,000	5	*				
46	Denver City, S. L.	Colo.	5,000,0 0	500,000	10	*				
47	Denver Gold	Colo.	300,000	60,000	5					
48	Deseret, G. S.	Utah	500,000	50,000	10	*				
49	Dunderberg, S.	Colo.	1,500,000	150,000	10	*				
50	Durango, G.	Colo.	500,000	500,000	1	*				
51	Eastern Dev. Co., Lt.	N. S.	1,500,000	150 000	10	990,000	Mar.	1886	1.00	
52	El Cristo, G. S.	U.S.C	1,000,000	500,000	2					
53	El Dorado, G.	Cal.	1,000,000	250,000	4	*				
54	El Talento, G.	U.S.C	1,000,000	500,000	2					
55	Empire, S.	Utah	10,000,000	100,000	100					
56	Enterprise, S. L.	Colo.	800,000	80,000	10	*				
57	Eureka Tunnel, S. L.	Nev.,	10,000,000	100,000	100	*				
58	Exchequer	Nev	10,000,000	100,000	100	880,000	July	1887	.20	
59	Found Treasure, G. S.	Nev.,	10,0 0,000	100,000	100	6,030	Nov.	1887	.06	
60	Gold Cup, S.	Colo.	500,000	500,000	1	*				
61	Gold Placer, G.	Colo.	5,000,000	200,000	25	220,314	Dec.	1885	.25	
62	Gold Rock, G.	Cal.	1,000,000	500,000	2	*				
63	Goodshaw, G.	Cal.,	10,000,000	100,000	100	*				
64	Grand Belt, C.	Tex.	12,000,000	120,000	100					
65	Grand Duke	C lo.	800,000	80,000	10					
66	Great Romance, G.	U.S.C	1,000,000	500,000	2	*				
67	Gregory-Bobtail, G.	Colo.	550,000	550,000	1	*				
68	Gregory Con., G.	Mon.	3,000,000	300,000	10					
69	Harlem M. & M. Co. G.	Cal.,	1,000,0	200,000	5					
70	Head Cent. & Tr. S. G	Ariz.	10,000,000	100,000	100					
71	Hector, G.	Cal.,	1,500,000	300,000	5					
72	Highland, C.	Mich	500,000	25,000	25					
73	Hortense, S.	Colo.	2,000,00	200,000	10					
74	Huron, C.	Mich	1,000,000	40,000	25	280,000	May	1887	3 00	
75	Iron Gold & Silver, S	N. M.	2,000,000	200,000	10					
76	Iroquois, C.	Mich	1,250,000	50,000	25					
77	J. D. Reymert	Ariz	10,000,000	100,000	100	*				
78	Julia Cons., G. S.	Nev.,	11,000,00	110,000	100	1,452,000	Apl.	1887	.10	
79	Kearsarge, C.	Mich	1 250,000	50,000	25	150,000	Oct.	1887	1.00	
80	Laclede	N. M.	2,000,000	200,000	10					
81	Lacrosse, G.	Colo.	1 0 ,000	100,000	10	*				
82	Lee Basin, S. L.	Colo.	5,000,000	500,000	10	*				
83	Lucerne, S.	Colo.	5,000,000	500,000	10	*				
84	Mammoth Bar., G.	Cal.,	10,000,000	100,000	100	50,000	Dec.	1881		
85	Mariposa pref., G.	Cal.,	5,000,000	50,000	100	1,687,500	Feb.	1883	.25	
86	" common, G.	Cal.,	10,000,000	100,000	100	1,975,000	Dec.	1881	.20	
87	May Belle, G.	Cal.,	10,000,000	100,000	100	84,000	Mar.	1884	.15	
88	Mayflower Gravel.	Cal.,	1,000,000	100,000	10	260,000	Nov.	1887	.25	
89	Medora, G	Dak.	25 ,000	250,000	1					
90	Mexican, S.	Nev.,	10,000,000	100,000	100	2,615,960	July	1887	.25	
91	Middle Bar, G.	Cal.	400,000	200,000	2	*				
92	Mike & Starr, S. L.	Colo.	1,000,000	200,000	5	*				
93	Monitor, G.	Colo.	100,000	100,000	1	*				
94	Moose Silver, S.	Colo.	3,000,000	300,000	10	*				
95	Nachoochee, Lt., G.	Ga.,	1,000,000	200,000	5					
96	Neath, G.	Colo.	1,000,000	100,000	10					
97	Nevada Queen, S.	Nev.	10,000,000	100,000	100	80,000	Mar	1887	.50	
98	New Germany, G	N. S.	100,000	100,000	1	*				
99	New Pittsburg, S. L	Colo.	2,000,000	200,000	10	*				
100	North Standard, G.	Cal.,	10,000,000	100,000	100	20,000	Nov			
101	Noonday	Cal.,	600,000	60,000	10	268,000	Dec.	1881	.10	
102	Oneida Chief, G.	Cal.	500,000	125,000	4	*				
103	Oriental	Nev.,	2,000,000	200,000	10					
104	Oriental & Miller, S.	Nev.,	10,000,000	400,000	25					
105	Osceola, G.	Colo.	5,000,000	50,000	100					
106	Overman, G. S.	Nev.,	11,520,000	115,200	100	3,765,680	Aug.	1887	.25	
107	Park, S.	Utah	2,000,000	200,000	10					
108	Peer, S.	Ariz.	10,000,000	100,000	100	135,000	Nov.	1886	.10	
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NEW YORK MINING STOCK QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 10.		Dec. 12.		Dec. 13.		Dec. 14.		Dec. 15.		Dec. 16.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon	...	.....	.....	...	...	....	....	....	....	.....	....	.....	.....
Argenta, Nev	....	.....	.....	.....	...	....	....	....	....	.....	....	.....	.....
Bassick, Colo	.....	.....	.....	...	.....	.....	..	.. ..	....	...	.. ..	.. ..	.....
Belcher, Nev	.....	.. ..	.....	....	...	.....	.....	.....	.....	.....	.. ..	.. ..	.....
Belle Isle, Nev	.....	.....	.....	.....	.70	.....	.....	.....	.....	.....	.....	.....	200
Bodie Cons., Cal	.....	.....	2.45	2.35	2.50	2.45	3.25	3.05	3.10	3.00	3.05	3.00	3,970
Breece, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bulwer, Cal	....	.....	.....	.....	..	....	1.00	.95	....	.....	....	....	550
Caledonia, Dak	....	....	1.70	.....	1.75	.....	1.80	1.75	.....	....	....	....	2,100
Chollar, Nev	...	.....	7.13	.....	7.64	.. .	...	....	....	....	....	....	300
Chrysolite, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Colorado Cent'l, Colo.	.....	... .	.....	...	.....	.....	.....	.....	2.05	....	.....	....	300
Cons. Cal. & Va., Nev.	22.38	... ..	24.25	....	25.00	23.50	26.00	25.00	....	....	22.13	....	598
Crown Point, Nev	....	.....	9.75	....	.....	.. ..	....	....	....	...	9.13	....	300
Deadwood, Dak	....	.....	....	....	.....	.....	....	....	1.90	....	1.95	1.75	500
Dunkin, Colo	.....	... .	.98	.....	.....	.....	.. ..	....	....	....	....	....	100
Eureka Cons., Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dak.	....	.....	.....	.....	.....	.....	...	.....	.....	.. ..	.....	.....	.....
Freeland, Colo	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gould & Curry, Nev	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green Mountain, Cal.	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross, Nev.	8.50	.....	9.13	...	.....	.....	.....	.....	.....	.....	.....	.....	180
Helena, Mont	....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Holyoke, Idaho	....	.....	....	.....	.....	...	.08	....	.08	..	.....	.....	1,500
Homestake, Dak	.....	.....	....	.....	12.75	....	12.00	.. ..	12.00	....	.....	.....	178
Horn-Silver, Ut	.....	.....	.....	.....	.....	.....	.85	.83	.....	.....	.82	.80	700
Independence, Nev	.....	...	.....	.....	.....	.....	.. ..	.....	.....	.....	.....	.....	.....
Iron Hill, Dak	.....	.. ..	.....	.....	.....	.....	.. ..	.....	.....	.....	1.00	.....	500
Iron Silver, Colo	.....	.....	2.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Leadville C., Colo	....	.....	.30	.....	.....	.....	.30	.....	.....	.....	.....	.....	350
Little Chief, Colo	....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pittsburg, Colo.	....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Nev	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono, Cal	....	.....	2.00	1.95	...	.....	2.20	2.15	.....	.....	.....	.....	900
Mount Diablo, Nev	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Nev	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle Isle, Nev.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut	...	.....	27.00	... ..	27.00	.	.....	.....	.....	.....	.....	.....	105
Ophir, Nev	.....	.....	12.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Plymouth, Cal	.....	.....	....	..	....	....	.....	.....	.....	...	19.13	.....	20
Quicksilver Pref., Cal	.. ..	.....	31.75	.....	.....	...	33 00	32.00	.....	.....	.....	.....	300
" Com., Cal	....	.....	.....	....	9.75	9.50	....	.....	.....	.....	.....	.....	250
Robinson Cons., Colo	.....	.....	.....	.....	.40	.....	.....	.....	.....	.....	.....	.....	1,200
Savage, Nev	....	.....	.....	.....	.....	...	8 50	.....	.....	.....	.....	...	100
Sierra Nevada, Nev	.....	.....	6.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Silver King, Ariz	.....	.....	.....	.....	4.75	4.50	4.75	.....	4.75	....	4.50	.....	950
Standard, Cal	2.35	.....	2.30	.....	2.35	.....	2.35	....	2.20	....	2.25	.....	1,700
Stormont, Ut	.....	.....	...	.....	.....	.....	.....	.....	.....	... ..	.....	.....	.....
Surinam, D. G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket, Nev	...	.....	.....	.....	.....	.....	7.63	.....	.....	.....	6.63	...	400

NON-DIVIDEND-PAYING MINES

NAME AND LOCATION OF COMPANY.	Dec. 10.		Dec. 12.		Dec. 13.		Dec. 14.		Dec. 15.		Dec. 16.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta	.....	.. ..	.....	.....	.....	.....	.....	.....	.....	.....	2.50	..	200
Amador, Cal	1.75	....	1.75	1.70	1.70	.....	1.70	.....	1.70	.....	1.75	1.65	3,000
American Flag	.....	.....	.....	....	.08	.. ...	.08	.....	.09	.....	.....	.....	1,625
Barcelona, Nev	.....	.....	.52	....	.....	...	.....	...	..	.....	.45	... ..	700
Bechtel Con., Nev	.....	.....	.....	.....	..	.....	.....	.....	.....	.....	.....	.....	.....
Best & Belcher, Nev.	.....	.....	.....	.....	..	.....	.....	.....	.....	.....	.....	.....	.....
Brunswick	1.60	.....	1.60	....	1.60	....	1.60	....	1.65	....	1.65	.....	2,900
Carupano	.. ..	....	.. ..	....	.. ..	....	.. ..	....	.. ..	....	.. ..	.....	.....
Cashier	....	....	.31	.30	.32	.29	....	....	.32	....	.32	....	5,400
Castle Creek, Id	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Campano	....	.....	.....	.....	1.80	1.75	.....	.....	1.80	.....	.....	.....	900
Columbia & Beaver	.....	.....	.. ..	.....	.. ..	.....	.. ..	.....	.. ..	.....	.. ..	.....	.....
Con. Imperial	.....	.....	.....	.....	.. ..	.....	.. ..	.....	3.10	....	.....	.....	400
Con. Pacific	.....	.....	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
*Eclipse	.....	.....	1.63	1.38	1.75	.....	1.75	.....	2.25	1.63	2.00	....	2,900
El Cristo, U. S. Col.	.....	.....	.....	.....	2.25	.....	.....	.....	1.90	....	.....	.....	300
Exchequer	.....	.....	.....	.....	2.90	.....	.....	.....	2.30	....	.....	.....	300
Found Treasure	...	.. ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hector	....	....	.. ..	....	.50	.40	.....	.....	.....	.....	.....	.....	300
Julia, Nev	.....	.....	.....	....	1 00	.....	1.00	.....	.80	.....	.....	.....	600
Kossuth	....	.....	.....	....	.05	.....	.....	.....	.....	.....	.....	.. ..	100
Lacrosse, Colo	.12	.....	.12	.....	.12	.....	.....	.....	.12	.....	.13	....	8,800
Mexican, Nev	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middle Bar, Cal	.30	....	.30	.....	.30	.....	.30	....	.30	....	.30	.....	3,300
Monitor	.14	.....	.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,300
New Pittsb'g, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Stand'd, Cal.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, Ut.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oneida Chief	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pri'nt'l&Mil'r, Nev.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phœnix of Arkan's	..	.....	.....	.....	.....	.....	.75	....	.75	....	.65	.....	2,300
Phœnix of Arizona	.	.....	.....	....	.....	.....	.....	.....	.50	.....	.....	.....	100
Potosi	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahann'k, Va.	.20	...	.20	....	.20	.....	.19	.....	.....	.....	.20	..	4,800
Red Elephant, Colo.	....	... ..	.....	....	..	.....	.....	.....	.....	.....	.....	.....	.....
Renfrew, N. S	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saint Kevin, Colo	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Sebastian	...	.....	3.25	....	3.25	....	3.25	... ..	3.25	.....	3.25	....	550
Santiago, U. S. Col.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Security, Colo	1.10	.....	1.00	.90	1.00	.83	.60	....	.90	.....	1.00	.95	2,035
Silver Cliff, Colo	....	.....	.....	.....	.03	.....	.....	.....	.....	.....	.....	.....	1,100
Silver Hill	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Queen, Ariz.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stanislaus, Cal	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State L'e, I. & I., Nev.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, Nev.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel, Nev.	.21	.19	.24	.20	.21	.19	.24	.20	.23	.20	.22	.21	31,884
Taylor Plumas, Cal.	..	....	.....	...	.02	....	.....	....	.....	.....	.....	.....	600
Tornado	.....	.....	.....	.....	1.00	.....	1.00	.....	1.00	.....	1.00	.....	800
Union Cons., Nev	....	.....	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Utah	....	...	.....	.....	.....	.....	.....	.....	2.10	.....	.....	.....	200

*Dealt in at the New York Stock Exchange. Unlisted Securities.

BOSTON MINING STOCK QUOTATIONS

NAME OF COMPANY.	Dec. 9.	Dec. 10.	Dec. 12.	Dec. 13.	Dec. 14.	Dec 15.	SALES.
Atlantic, Mich	.....	.....	.. ..	.....	13.00	.....	50
Bodie, Cal	....	.....	.....	.....	.....	.....	.....
Bonanza D	.....	.....	1 47	1 38	1.38	1.38	1,550
Boston & Mont., Mont	.....	.....	.....	.....	.....	.....	.....
Breece, Colo	.....	30	.....	.....	.....	.....	100
Calumet & Hecla, Mich	..	188	186	.. ..	190	180	187	186	189½	187	354
Catalpa, Colo	.27	.....	.26	....	.27	.....	.....	.....	.....	.....	800
Central	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virginia, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Dunkin, Colo	1.00	.....	1.00	.....	1.05	1.00	1.00	.....	....	.. ..	.....	.....	900
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin, Mich	15.00	.....	15.00	.....	15.00	.....	15.38	15.00	15.50	15.00	15.88	15.50	1,472
Freeland, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green, Mo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross	.....	.....	8.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Ironton Iron Co., Mich	.....	...	.....	..	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kearsarge	.....	.....	6.00	.....	5 75	.....	5 75	5.50	5.50	.....	5.50	.....	570
Little Chief	.....	.....	.....	.. ..	.....	...	1.50	.....	.....	.....	.....	.....	.....
Napa, Cal	1.75	.....	1 75	... ..	.....	.....	.....	.....	.....	.....	.....	.....	350
Osceola, Mich	...	.....	24.00	.....	.....	.....	24.00	23.00	23 00	.....	23.50	23.25	495
Pewabic, Mich	.....	.. ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy, Mich	... ..	.. .	59.00	58 50	...	.....	60.50	60.00	60.50	60.00	63.00	61.00	585
Reace	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ridge, Mich	1.50	.....	...	....	.....	.....	1.50	....	..	.....	1.50	.....	600
Robinson, Colo	...	.....	... ..	....	.. ..	.....	.....	.....	...	.....	..	.....	.....
Sierra, Nev	...	.. ..	.....	....	.....	.....	... ..	.....	.....	.....	..	.....	.....

NAME OF COMPANY.	Dec. 9.	Dec. 10.	Dec. 12.	Dec. 13	Dec. 14.	Dec. 15.	SALES.
Allouez, Mich	1.75	... ..	1.75	.....	1.88	..	1.88	.....	1.88	1.75	1 88	1.75	1,625
Arnold, Mich	... ..	... ..	.....	.....	.....	.....	.60	.....	.60	.....	400
Aztec	.....	.....	.25	.....	.....	.....	.30	... ..	.	.....	500
Bowman Silv'r, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brunswi'k	1.60	... ..	1.60	.....	1.60	..	.....	.....	.....	.....	.....	.....	400
Canada	.08	.....	... ..	.....	.....	.....	.....	.....	.05	.....	800
Contentment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	400
Cusi, N. Mex	.....	.....	.16	.....	.....	.....	.....	.....	.....	.....	200
Empire	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humboldt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron, Mich	.....	.....	.....	.....	.....	.....	.....	.....	5.25	.....	100
Kossuth	.12½	.....	.....	.....	.....	.....	.....	.....	.08	.....	300
Mesnard	.50	.....	.....	.....	.....	.....	.50	.....	.....	.....	200
National, Mich	...	.....	.....	.....	.....	2.50	.....	.....	.....	.....	50
Native	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oriental & M., Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pontiac	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	500
Rappahannock, Va	19	....	.19	.....	.....	.....	.....	.....	.18	.....	1,100
Security, Colo	1.00	.....	.....	.....	1.00	.....	.....	.....	.....	.....	200
South Side	.50	.....	.....	.....	.50	.....	.....	.....	.50	.40	50	.....	1,550
St. Louis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Star	.....	.....	.....	.....	.....	.....	.....	.....	.55	.50	500
Sutro Tunnel, Nev.	.23	.....	.21	.....	.18	.....	.....	.....	.20	... ..	1,900
Tamarack	.....	... ..	108	.....	.. ..	....	112	....	110	109	112	110	257
Washington	.40	.....	... ..	... ..	.....	.55	....	.62½	.....	.....	.....	.....	1,050
Winthrop	.....	.....	....	.50	.....	.....	.50	.....	.....	.....	400

New York: Dividend shares sold, 19,011. Non-dividend shares sold, 79,294. Total New York, 98,305.
Boston: Dividend shares sold, 7,926. Non-dividend shares sold, 12,432. Total Boston, 20,358.

COAL STOCKS.

NAME OF COMPANY.	Par value of shares.	Dec. 10.		Dec. 12.		Dec. 13.		Dec. 14.		Dec. 15.		Dec. 16.		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Barclay Coal	.....	.....	.. ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cameron Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ches. & O. RR	100	.. ..	.....	4¾	3¾	.....	.....	.. ..	.....	.....	.....	.....	.....	1,875
*Chic. & Ind. Coal RR	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90½	.....	100
Col. & Hocking Coal	100	.....	.....	25⅜	25	26	25½	25⅜	25¼	25¾	25¼	26½	25½	1,700
Col., C. & I	100	35¼	35	34½	33	34½	32½	33¾	33½	34	....	34	33½	2,890
Consol. Coal	100	.....	.....	.....	.....	25	.....	.....	.....	.....	.....	.....	.....	200
Cumb. C. & I	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del. & H. C	100	103⅛	102⅞	103	102	103	102	102⅞	102	103	102½	103	102¾	4,685
D., L. & W. RR	50	129⅛	128⅝	128⅝	126	127⅛	125¾	126⅞	125⅝	127¼	126¼	127	126⅛	171,170
Elk Lick Coal Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hocking Valley	100	.....	.....	23	22¾	23	22¼	23	.....	23	22½	.....	.....	1,000
Lehigh C. & N.†	50	47	46⅞	.....	.....	46⅞	46⅝	46⅞	46⅝	46¾	.....	.....	.....	945
Lehigh Valley RR.†	50	.....	.....	55	54⅞	54⅞	54⅝	54⅞	54¾	54⅞	.....	.....	.....	295
L. & W. C. & I. Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marshall Con. Coal	100	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maryland Coal	100	.....	.....	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	200
Montauk Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morris & Essex	50	.....	.....	.....	.....	.....	.....	.....	.....	133½	133	.....	.....	152
New Central Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. J. C. RR	100	75⅝	74⅝	74½	73¾	74⅜	73⅜	74¾	74¼	74¾	74	74⅝	74½	7,800
N. Y. & S. Coal	50	.. ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y., Susq. & Western	100	.....	.....	8⅝	8½	8¾	8½	8½	.....	.....	.....	9	.....	595
Do. pref	100	.....	.....	28½	28	28	..	28½	28¼	.....	.....	28	.....	1,055
N. Y. & Perry C. & I	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk & Western R R	100	.....	.....	.....	.....	.....	.....	16	.....	15¼	15	.....	.....	250
Do. pref	100	41½	40¾	40½	40	40½	40	41⅜	40½	41⅜	41	41⅛	40¾	4,960
Penn. Coal	50	.....	.....	.....	.....	.....	.....	272	.....	.....	.....	.....	.....	44
Penn. RR.†	50	54	53⅞	53⅞	53¾	53⅞	53⅛	53¾	53⅜	53⅞	53¾	.....	.....	3,667
Ph. & R. RR.**	50	67⅜	67⅛	67	65⅜	66⅜	64⅜	66⅛	64⅞	66⅜	65⅝	66⅜	65¾	404,476
Spring Mountain	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee C. & I. Co	100	....	.....	26¾	26	.....	.....	27	.....	27	26½	27	.....	1,350
Whitebreast Fuel Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

** Of the sales of this stock, 67,186 were in Philadelphia, and 337,920 in New York.
† The quotations for these stocks are not percentage, but actual price.
Dealt in at the New York Stock Exchange Unlisted Securities.

Total sales, 609,409.

San Francisco Mining Stock Quotations.

COMPANY.	CLOSING QUOTATIONS. Dec. 9.	Dec. 10.	Dec. 12.	Dec. 13.	Dec. 14.	Dec. 15
Alpha	.....	.....	.....	.....	.....	.....
Alta	2½	2.55	2½	2½	2.55	2.40
Argenta	.....	.....	.....	.....	.....	.....
Belcher	.....	.....	.....	.....	.....	.....
Belle Isle	.65	.65	.60	.60	.65	½
Best & Bel	8	8⅜	8¾	8¾	8¼	7⅛
Bodie	2 55	.....	2.55	2.55	3¼	3.10
Bulwer	.90	.80	.85	.85	.95	.90
Chollar	7⅜	7¼	7¼	7¼	7⅛	6¼
Com'nwith	3 40	3½	3½	3½	3¼	3¼
Con. C. & V	23	23¾	23¼	23¼	23⅜	21½
Con. Pac	.....	.....	.....	.....	.....	.....
Crown Pt	9⅝	10⅛	10½	10½	10⅝	9¾
Eureka C	6¼	6⅛	6	6	.....	6
Gould & C	6	6¼	6½	6½	6½	6⅝
Hale & N	8⅞	9	9¾	9¾	8⅞	8⅝
M. White	.....	.....	.....	.....	.....	.....
Mexican	6¼	6¼	6¾	6¾	6¼	6
Mono	2.05	.....	.....	.....	2.20	2.15
Mt. Diablo	.....	.....	.....	.....	.....	.....
Navajo	1	1	1	1	1	1
Nev. Queen	3.15	3.10	3	3	3	2.65
N. Belle I	8	.....	8⅛	8⅛	7⅞	7⅞
Ophir	11⅛	11⅝	11⅞	11⅞	11⅝	10⅝
Potosi	6¾	7.00½	7	7	6⅞	6½
Savage	8⅝	8½	8¾	8¾	8¾	8
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nev	5⅜	6	6¾	6¾	6⅛	5¾
Sutro Tun	.....	.....	.....	.....	.....	.....
Tip Top	.....	.....	.....	.....	.....	.....
Union Con	4.10	4.35	6	6	5⅝	5¼
Utah	2 15	2.05	2¼	2¼	2.10	2.05
Yellow Jkt	7¼	7½	7½	7½	7¾	7⅛

ing, not a few having an impression that some legislative action would be sprung in the country to unsettle, if not demoralize things. In this they have not been mistaken, although there is reason to believe that it will go no further than talk. In regard to values sale is the thing to go by under existing circumstances. Quotations will be found in our weekly register of prices.

SALES REPORTED SINCE OUR LAST.

Coal and Coke Smelted Lake Ore.

650 Tons Gray Mill ..... 17.00 4 mo.
500 Tons Gray Forge ..... 17 00 4 mo.
500 Tons Standard Bessemer ..... 19 00 cash.
350 Tons Standard Bessemer ..... 19.50 4 mo.
250 Tons Neutral Mill ..... 17.25 4 mo.
150 Tons No. 1 Foundry, all ore ..... 20.25 cash.
25 Tons No. 2 Foundry, all ore ..... 20.50 4 mo.
25 Tons Foundry ..... 19.75 4 mo.

Native Ore.

200 Tons White Iron ..... 15.75 cash.
100 Tons Gray Forge ..... 16.75 4 mo.
25 Tons Silvery ..... 19.50 cash.
25 Tons Silvery ..... 20.00 4 mo.
20 Tons No. 1 Foundry ..... 19.65 4 mo.
20 Tons No. 2 Foundry ..... 19.00 3 mo.
20 Tons Open Gray Extra ..... 18.00 4 mo.

Muck Bar.

500 Tons Good Neutral ..... 29.25 cash.
300 Tons Good Neutral ..... 29.25 cash.
250 Tons Good Neutral ..... 29.25 cash.
200 Tons Good Neutral ..... 29.75 cash.

Steel Billets.

300 Tons Steel Billets ..... 29.25 cash.

Steel Wire Rods.

500 Tons Imported, New York delivery ..... 40.00 cash.

Steel Rail Ends.

500 Tons Rail Ends ..... 19.85 cash.

Philadelphia. Dec. 16.

[From our Special Correspondent.]

The Pennsylvania iron trade is in a peculiar condition at present. Very few companies are in debt or have outstanding obligations which will be hard to handle. The iron interests of this city have been pursuing a very conservative course for the past year or two, and have every thing well in hand. This explains why it is so difficult to crowd prices down. Another stronger reason is that prices are already as near cost as it is possible to have them and to do a legitimate business. There is a heavy consumption in progress, and notwithstanding some statements to the contrary, there is a fair amount of business in crude and finished iron in a small way. The reason of this is that a great many small buyers have declined all along to purchase more than they needed to see them through each batch of work as it came in. This class of consumers are not inclined to depart from their course, and their purchases will help to keep a steady, quiet movement of material all through the winter. There is neither any improvement or weakness in prices or demand. It is not likely that much will be done until January. Makers are not endeavoring to offer any inducements; in fact, are not able to. Stocks of crude iron are not such as to force makers into the market, and they are quietly awaiting developments. The opinion is that the average consumptive requirements for both forge and foundry iron will keep Pennsylvania furnace banks pretty clear. Nothing more has been done regarding a blowing out of a few furnaces, and all hands seem inclined to hold on in hopes that January orders will brighten things up. The usual quotations are insisted upon, and will not be shaded even then. A few additional sales of muck bars were made at quoted rates. A further falling off in orders for merchant bar has been noticed, but this is to be expected at this season. There is nothing of interest in the nail trade, every thing being at a standstill, and there is a probability that a good many machines will be thrown off at the end of this month and not be started up in January or until orders justify. Some few sales of plate and tank iron were made at what seems to be a shading of about $2 per ton, but there is no change in quotations. Skelp iron is dull, but the makers have some little business yet to do. The pipe makers are busy yet on small orders. Structural iron is without any change. Steel rails are dull, and buyers and makers are still at outs regarding bottom figures. It seems to be the intention to allow those who are willing to shade prices to do so and fill up. No very definite information can be obtained, although there are parties in the market now who would like to close for some 20,000 to 30,000 tons, and it was intimated to-day sales might be effected before Saturday. Old rails are dull at quoted rates. Selected scrap is selling in a very slow way at the usual figures. Quotations will be found in our weekly register of prices.

FINANCIAL.

NEW YORK, Friday Evening, Dec. 16.

The Condition of Trade.

The distribution of general merchandise this week has not been equal to that of previous weeks, owing in part to the diversion of attention to holiday purchases and to the prevalence throughout a large part of the country of mild and unseasonable weather. The total volume of business for 1887, however, promises to exceed that for 1886. The export trade continues a full tide taken altogether, although the record of foreign shipments of breadstuffs has declined within three months, as compared with the heavy exports during a like period last year. The late check to speculative activity in some staples is continued, and the decline in prices of wheat and corn are most noticeable. Cotton and petroleum prices, however, remain practically undisturbed. The speculative manipulation in tin, copper, and lead continues in full force, with the tendency of quotations upward, and cotton goods are firm and in demand, with the mills reporting orders ahead. The industrial situation generally is rather more quiet, and there are fewer signs of an early revival. This conclusion is based upon the fact that the demand for raw and manufactured iron remains, as so long reported, quiet if steady; that several prominent metal and other manufacturing establishments have shut down for a brief period and that in addition to the continuance of the Lehigh Valley coal miners and Western Pennsylvania glass workers' strikes, new labor disturbances appear nearly as fast as others are arranged. The attitude of railway officials who are believed to be in need of large quantities of steel rails for 1888 delivery remains undemonstrative, and purchases or orders thus far fall below expectations of thirty days ago. Sensational rumors by amateur business reporters that sales of rails have been made at $31 remain unconfirmed, and the price, therefore, continues nominally at $32@$32.50. The *American Manufacturer*, of Pittsburg, on the basis of its November report of pig-iron production in the United States in the month of November, and on like reports for preceding years, as well for December as for November, estimates the total production of pig-iron in the United States for the twelve months of 1887 at 6,200,000 gross tons, as compared with 5,600,000 tons in the whole of 1886, a gain of 10⅗ per cent., notwithstanding the prolonged strike and consequent interruption to production of the Connellsville coke miners early in the year. The strike of the Lehigh coal miners is believed to have increased the cost of production of Lehigh pig somewhat, but there is little evidence of serious curtailment of output thus far, owing to that strike. The production of pig-iron throughout the country on December 1 (based on weekly capacity in blast), shows but a moderate restriction of output during November.

The late anticipated renewal of a severe stringency in the leading domestic money markets gives no sign of appearing. Funds both on call and on time at New York continue in moderately good supply, and rates for loans of that character are respectively 4½@5½ and 6 per cent. The course of our shipments abroad as well as of the attitude of foreign investors and speculators in American railway and other securities is fairly indicated by the quotation for sight Sterling $4.85½@$4.85¾. At the more important interior money centers funds are not stringent, and at none of them are regular customers refused legitimate demands for accommodation by the banks. The tendency of money is this way, and this assists the desire to accumulate funds to meet the customary January 1st disbursements.

The Coal Road Stocks.

The course of prices of stocks in Wall street has been rather down than upward, under concerted attacks upon certain securities, and the absence of special support from the friends of those stocks. Lackawanna has lost 2⅜ points this week; Jersey Central, ⅝; Delaware & Hudson, ⅜, and Philadelphia & Reading, 1⅛ points.

Mining Stocks.

The past week has been one of extreme stagnation in mining circles. It was hoped that steadiness in San Francisco would lead to at least a slightly improved demand for mining shares, but this has not proved to be the case. It is evident that the year is to close with no improvement, and the intervening period is to be marked by the same dullness and indifference as is always witnessed in a holiday season. The prices ruling for most shares must be regarded in most instances as purely nominal.

Sutro Tunnel has attracted little attention during the week. The expiration yesterday of the time fixed for subscriptions to the new mortgage bonds has not had the effect of weakening the price of the stock, which was firmly held at from 19 to 24c. Consolidated California & Virginia advanced from $22.38 to $26, but to-day sold as low as $22.13.

Hale & Norcross shows an advance from $8.50 to $9.13. Yellow Jacket a decline from $7.63 to $6.63. Exchequer from $2.90 to $2.30.

Belle Isle shows one sale at 70c.; Tornado, a few at $1.

Quicksilver Preferred, in consequence of the further advance of the quicksilver market, advanced from $31.75@$33. Common declined from $9.75@$9.50.

Brunswick is firmly held, and advanced to $1.65.

Amador showed some activity at prices ranging from $1.65 to $1.75. Middle Bar at 30c.

Bodie Consolidated was one of the most active stocks on the list, and advanced from $2.35 to $3.25. Standard received also considerable attention, selling at from $2.20 to $2.35.

Mono showed a higher movement, going from $1.95 to $2.20.

A declining tendency is shown in Deadwood Terra, which was neglected the beginning of the week, and to-day went from $1.90@$1.75. Homestake was also lower, and declined from $12.75@$12. The Iron Hill Mining Company has passed its usual monthly dividend, and in consequence the price has dropped to $1. Caledonia held its own at from $1.75@$1.80.

The Tortilita Gold and Silver Mining Company, of Arizona, is reported to have brought suit, on the 14th inst., against James Gordon Bennett, of the New York *Herald*, for $500,000 damages for alleged libel. Joseph H. Reall, President of the company, has also brought a personal suit for libel against Mr. Bennett, claiming $250,000 damages.

We shall watch the proceedings with much interest. Meanwhile if the promoters of this huge bubble will appear before the Committee on Mining of the Consolidated Stock and Petroleum Exchange, and show themselves worthy of confidence by substantiating the claims they made for their mine, some of their victims would be duly thankful.

Cashier was not the favorite this week, and was quiet, selling at from 29@32c. Security sold as low as 60c., and it looks as if the price was going down still further, notwithstanding that the manipulators to-day put up the price to $1. Hector ruled at from 40@50c. Lacrosse at 12c. Colorado Central records a sale at $2.05.

Castle Creek shows only one sale at 10c. Holyoke a few at 8c.

Campano does not receive much attention, although it is a newcomer. The price has ruled at from $1.75 @$1.80.

San Sebastian was dealt in each day of this week at $3.25 per share.

El Cristo is neglected, and sales of only 300 shares are reported, selling on Tuesday at $2.25 and to-day at $1.90.

There has been quite a business in Silver King, which has been selling at from $4.50@$4.75.

Horn-Silver has declined to 80c., and shows but a small business. A few sales of Ontario are recorded at from $26@$27.

Phœnix of Arkansas shows a further decline at from 75@65c., some 2300 shares changing hands.

Phœnix of Arizona shows one sale of a hundred shares at 50c. per share.

Rappahannock has been firm at 19 and 20c

Auction Sale of Stocks.

The following securities were sold at auction in this city on the 14th inst.: 10 shares Ward Mining and Milling Company, $1; $4000 Fairmount Coal and Iron Company, 1st mortgage 6 per cent bonds, July, 1887, coupons on, 27; 50 shares Standard Oil Trust, $160.

Pipe Line Certificates.

Messrs. Watson & Gibson, brokers, 49 Broadway, report for the week as follows:

The oil market this week has been almost stagnant, only awakening to some activity to-day. The course of values is upward, the producers are confident of their position and of the success of their shut down movement, which is curtailing production over a million of barrels per month. There is not much outside speculation in oil, but it promises to become more active.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Dec. 10	76⅞c.	77c.	76½c.	76½c.	570,000
12	77	77⅜	76¾	77⅛	1,254,000
13	77¼	77¼	76¾	77	818,000
14	76⅞	77¼	76¾	77¼	963,000
15	77¼	77¼	76⅞	77	605,000
16	77⅜	78⅛	77	78⅛	2,194,000
Total sales in barrels					6,404,000

Meetings.

Annual and special meetings of the following companies will be held at the dates given:

Hanover Mining Company, No. 70 Devonshire street, Boston, Mass., January 7th, at ten o'clock, A.M. Special meeting for the purpose of acting on the matter of increasing the capital stock of the company to one million dollars ($1,000,000).

Jupiter Iron Mining Company, Ashland, Wisconsin, January 7th, at two o'clock P.M. Special meeting for the purpose of considering first, the question of selling the property to raise money to pay the indebtedness of the company; second, the question of issuing the bonds of the company, and securing payment of same by a mortage of the property, to raise money to pay its present indebtedness and continue the work of exploration and equipment of the Jupiter mine; third, the question of the dissolution of the company and the closing up of its affairs; fourth, the question of the reorganization of the company, and the reissue of the stock upon the basis of the relative amount of assessments paid by present stockholders and those under whom they hold.

Philadelphia & Reading Railroad Company, Association Hall, corner Fifteenth and Chestnut streets, Philadelphia, Pa., January 9th at twelve o'clock M.

Dividends.

Ætna Quicksilver Mining Company, of California, has declared a dividend of ten cents per share.

Andover Iron Company, of Pennsylvania, has declared a dividend of two per cent on the capital stock, payable December 12th, at Philadelphia, Pa.

Consolidated California & Virginia Mining Company, of Nevada, has declared a dividend, No. 12, of fifty cents per share, or $108,000, payable December 10th, at San Francisco.

Lehigh Railroad Company has declared a quarterly dividend of one and one quarter per cent, payable January 16th, to holders of the capital stock as they

stand registered on the books of the company, at 3 P. M., December 17th.

Plymouth Consolidated Gold Mining Company, of California, has declared a dividend, No. 56, of forty cents per share, or $40,000, payable January 5th, at 23 Nassau street, New York City.

St. Joseph Lead Company, of Missouri, has declared a dividend, No. 37, of twenty cents per share, or $30,000, payable December 20th, at No. 55 Liberty street, Room 39, New York City.

Virginia Mining and Improvement Company will pay the interest, coupon No. 2, due January 1st, 1888, on the first mortgage 6 per cent bonds, on and after that date, at the Boston Safe Deposit and Trust Company, Boston, Mass.

Assessments.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of sale.	Am'nt per share.
Alta, Nev.	36	Nov. 29	Jan. 3	Jan. 23	.50
Bannock, Idaho	..	Oct. 22	Dec. 2	Dec. 19	.25
Bellevue-Idaho, Id.	..	Nov. 15	Dec. 21	Jan. 10	.25
Canadian, Mich.	..	Nov.	Dec. 12	.....	.05
Chicago M. & M. Co.	..	Nov. 9	Dec. 11	Jan. 10	.10
Chollar, Nev.	24	Dec. 5	Jan 10	Jan. 31	.50
Elk Mt., Dak.	4	Nov. 8	Dec. 8	Dec. 28	.00½
Florence, Oak.	2	Nov. 1	*Dec 15	*Dec 30	.001½
Found Treasure, Nev	1	Nov. 5	Dec. 10	Dec. 30	.06
Galena S. & R., Dak.	1	Nov. 16	Dec. 30	Jan. 20	.10
Golden Fleece, Cal.	11	Oct. 15	Dec. 7	Jan. 4	10.00
Gould & Curry, Nev.	57	Oct. 28	Dec. 2	Dec. 27	.50
Heath, Idaho	2	Nov. 4	Dec. 10	Dec 30	.05
John Duncan, Mich.	..	Nov. 18	Dec. 20	Dec. 20	.25
Kossuth, Nev.	..	Dec. 8	.....	.....	.10
Mayflower, Cal.	39	Nov. 23	Dec. 30	Jan. 18	.25
Monarch, Dak.	..	.....	Dec. 8	Dec. 24	.02
Morgan, Cal.	12	Nov. 26	Dec. 31	Jan. 24	.15
Mountain, Cal	26	Nov. 14	Dec. 16	Jan. 4	.01
New Coso, Cal.	21	Oct. 19	Dec. 1	Dec. 26	.10
Oxford, Dak	1	Nov. 5	Dec. 6	Dec. 26	.01¼
Packer Lake, Cal.	3	Nov 21	Dec 19	Jan. 2	.001¼
Pocahontas, Dak.	5	Nov. 15	Dec 17	Jan. 3	.005
Potosi, Nev.	29	Nov. 30	Jan. 5	Jan. 26	.50
Rattler-Gilroy, Dak.	..	.....	Dec. 8	Dec. 27	.01½
Rubicon, Dak.	2	Nov. 23	Dec. 27	Jan. 20	.002
Seabury-Calkins, Dak.	7	Oct. 27	Dec. 1	Dec. 20	.01¼
Sierra Nevada, Nev.	90	Dec. 7	Jan. '11	Jan. 30	.25
Silver King, Dak	1	Nov. '10	Dec. 10	Dec. 28	.00½
Union Cons., Nev.	36	Nov. 10	Dec. 15	Jan. 3	.50

* The delinquent day and the day of sale were postponed to dates given above.

Financial Statements of Mining Companies.

The following statement shows the financial standing of the different mining companies on December 1st:

CASH ON HAND.

Alpha Con.	$9,239.62	Julia	$2,110.14
Alta	1,162.36	Justice	12,864.60
Andes	12.879.02	Kentuck	883.60
Belcher	26.039.80	Lady Washington	12,115.69
Benton Con.	9,224.10	Mexican	7.521.75
Best & Belcher	8,517.34	Mono	24,169.45
Bodie Con	48.473.96	†North Belle Isle	51,322.83
Bulwer Con	15 390.12	North Bonanza	4,107.25
Bullion	3 003.39	Occidental	427.74
Challenge	15,315.19	Ophir	21,147 35
*Con. Cal. & Va.	120,218 38	Orleans	1,567 54
Con. Imperial	10,137.05	Overman	42,885.13
Crocker	5,158.95	Peer	4 687.00
Dudley	1,122.81	Peerless	24,126 75
Elko	68.000 00	Phil Sheridan	6,434.50
Eureka Con.	68,000.00	Pondere	1,321.17
Exchequer	11.638.47	Scorpion	7,467.49
Found Treasure	597.17	Sierra Nevada	2,624.82
Gould & Curry	37,850.97	Standard Con.	82,178 82
Head Center	1,303.62	Syndicate	10,998.59
Head Center & Tranquility	6,306.93	Trojan	4,706.50
Independence	6,052.76	Union Con.	1,037.83
Imperial	10,137.00	Utah Con.	4,406.64
J. D. Reymert	2,550.09	Weldon	6,523.67

* $120,218.38 in cash and $46,055.38 in unsold bullion with further shipments to arrive—the monthly expenses have been partly paid.
† Unsold bullion

INDEBTEDNESS.

Chollar	19,520.11	Nevada Queen	53,035.43
Commonwealth.	27,368.04	Occidental Con.	483.06
Crown Point	6,354.53	Potosi	32,426.27
Hale & Norcross	22.234 12	†Savage	40,860.97
Holmes	8,350.53	Seg. Belcher	6,861.29
Mount Cory	44,337.74		

† There is enough bullion on hand in the Virginia office to clear off this indebtedness.

Boston Mining Stocks. Dec. 15.

[From our Special Correspondent.]

The market for copper stocks has been fairly active this week, but prices have been somewhat irregular, and, on the whole, do not respond to the advance in ingot copper which would naturally be expected, owing doubtless to the fact that the general public do not believe the rise to be a permanent one, and that on the reaction stocks will recede and they will get left. Buyers have to be educated up to be familiar with higher prices before they take hold with much vim, and we venture to predict that within thirty days there will be more anxiety to buy stocks than to sell them, especially of the speculative list, all of which we think will sell at much higher prices than now quoted. Calumet & Hecla has had its ups and downs this week, and quite an active trading has resulted. The early quotations were off $3, with sales at $187. On Monday the reports from the mine regarding the fire were so unfavorable that the stock went off to $175, but later it recovered and sold up to the opening price, and to-day at $189, so that the loss for the week has been slight.

Franklin declined to $14½, but rallied quickly, and to-day sold at $15⅞, its highest price on this rise. A dividend of $1 per share is assured for next month, and some holders expect that $2 will be forthcoming before July, 1888.

Quincy advanced steadily from $58½@$63, without calling out much stock. This stock is largely held by investors and does not come to the market so freely as some others.

Osceola, next to Calumet & Hecla, has been the weakest stock on the list. It opened at $24½, declined to $23, and only gained $⅛, to $23½; last week it sold at $26.

Atlantic steady at $12¾@13, with not much doing in it.

Tamarack advanced from $108@112, and is getting to be fairly active as a trading stock.

Kearsarge hardly as firm as last week, but declined only $¼; last sales being at $5½.

In the fancy list there has been a good business, and prices generally continue to advance. Allouez sold at $1¾@8¼. National declined from $3 to $2½. Ridge sold at $1⅜@$1½. Mesnard at 50c. South Side at 40@50c. Winthrop at 50c. Arnold at 60c. Pontiac at 45c. Washington at 55@62½c. Aztec at 25@30c. and Star at 50c.

In other mining stocks Bonanza sold at $1¼ to $1,⅞ Dunkin silver steady at $1. Catalpa and Crescent in better demand at 20c. for former and 15c. for latter. Breece declined to 27½@30c.

St. Louis Mining Stocks. Dec. 14.

[From our Special Correspondent.]

The market this week has again been largely influenced by the course of West Granite, which stock has been very erratic in its movements. After advancing rapidly, as stated in our last report, until it reached $1.85 per share, the price declined just as fast until sales were effected as low as 95 cents per share. At this figure new purchasers appeared, and the stock slowly advanced until to-day it can be quoted steady and dull at $1.12½ to $1.20. Telegraphic news from the the mine continues of a very favorable character, cut until this can be confirmed by detailed mail advices, the general public is not disposed to come into the market as extensive purchasers. The stock next in interest to West Granite has been Golden Era, also also a Montana mine. This stock advanced steadily on favorable news until it reached $1.40 per share, and closed steady at from $1.25 to $1.30. All other stocks have been very dull, with few transactions, and we don't look for much business until after the new year commences. We append quotations:

	Bid.	Askec.
Adams, Colo.	$2.85	$3.00
Black Oak, N. Mex	.67½	.70
Bremen, N. Mex.	.10	.15
Cariboo, N. Mex	.52½	.55
Cleveland, Colo.	...	....
Courtland	..	.20
Dinero, Colo.	.40	.45
Granite Mountain, Mont.	58.00	60.00
Gray Eagle, N. Mex.	.25	.30
Golden Era, Mont.	1.25	1.30
Hope, Mont.	6.90	7.05
Ideal, Colo.	...	.01½
Jumbo, Colo.	.85	1.00
Juniper	.10	.15
Laclede, N. Mex.	....	.02½
Peacock, N. Mex.	.35	.40
Pat Murphy	1.45	1.50
Quincy, Colo.	....	.10
Sheridan, N. Mex.	.11½	.15
Small Hopes Cons., Colo.	5.50	6.00
St. Louis & Mex. Imp., Mex.	.30	.42½
San Louis & San F., Mex.	.90	1.00
St. Louis & Yavapai, Ariz	.18½	.20
West Granite, Mont.	1.12½	1.20

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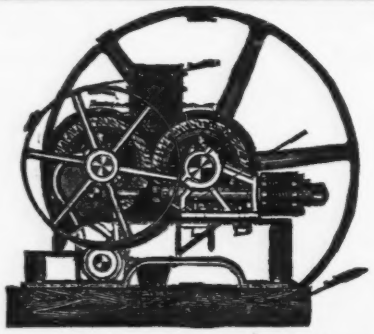

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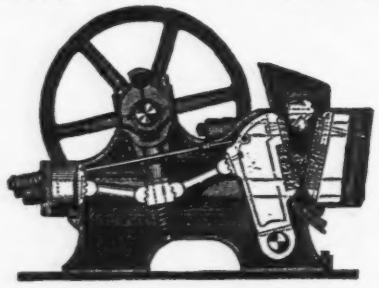

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